INTERNATIONAL CONFERENCE ON MATHEMATICS
“An Istanbul Meeting for World Mathematicians”
Minisymposium on Approximation Theory &Minisymposium on Math Education
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Chairman's Welcome Speech

Dear Guests,

On behalf of the organizing committee, welcome to International Conference on Mathematics: *An Istanbul Meeting for World Mathematicians*, 3-6 July 2018, Istanbul, Turkey. First of all, we present our deepest thanks to Fatih Sultan Mehmet Vakif University Management due to their great hospitality and understanding.

The conference aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results about mathematical sciences.

Besides these academic aims, we also have some social programs for introducing our culture and Istanbul to you. We hope that you will have nice memories in Istanbul for conference days.

We wish to all participants efficient conference and nice memories in Istanbul.

Thank you very much for your interest in International Conference on Mathematics: *An Istanbul Meeting for World Mathematicians*.

Kenan YILDIRIM, Ph. D.

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Contents

More on fuzzy hyperfilters of hyperlattices

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The aim of this paper is to introduce the notions of fuzzy hyperfilters and fuzzy prime hyperfilters in hyperlattices. In this way, some characterizations of hyperfilters and prime hyperfilters are given. Furthermore, the conditions under which a fuzzy hyperfilter is a fuzzy prime hyperfilter. Finally, we give the notion of fuzzy hyperlattices isomorphism.

Keyword(s): Hyperlattices, hyperfilter, prime hyperfilter, fuzzy hyperfilter, fuzzy prime hyperfilter, homomorphism of hyperlattices.

Simultaneous factorization of integers close to those of a system of infinitely large integers

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Let $m \geq 1$ be an integer, and let $(N_1, N_2, ..., N_m)$ be $m-$ tuples of unlimited positive integers. In this paper we are interested in the factorization of the integers of the system $(N_1 - r_1, N_2 - r_2, ..., N_m - r_m)$, where $r_1, r_2, ..., r_m$ are relatively small integers.

Keyword(s): Nonstandard analysis, Factorization, Integer.

Optical Solutions in Birefrigent Fibers with Two Integration Function Process

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In this article, two integration function process for solving the nonlinear Schrödinger equation is introduced. These are extended Jacobi's elliptic function approach and exp(-Φ(φ))-expansion method. The being condition for these solutions are also found that are conferred as definite provision. The found solutions are identified bright optical soliton, dark soliton, singular soliton and traveling wave solutions. Reliability of our solution is given graphical consequens. The solutions of our equation are computed in the form of rabidly convergent series with easily calculable components by using mathematica software package. Reliability of the method is given graphical consequens and series solutions are made use of to illustrate the solution. The found consequens show that the method is a power and efficient method in determination of solution the nonlinear Schrödinger equation.

Keyword(s): Jacobi's elliptic function, exp(-Φ(φ))-expansion method, Birefringent fibers, The nonlinear Schrödinger equation, Solitons.

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Lattice-Normed Vector Lattices and Unbounded p-Convergence

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Let X, E be vector lattices, and $p: X \to E_+$ be a monotone vector norm (i.e., $p(x)=0 \Leftrightarrow x=0$; $p(\lambda x)=|\lambda|\, p(x)$ for all $\lambda \in R$ and $x \in X$; $p(x+y) \le p(x)+p(y)$ for all $x, y \in X$; and $x \le y \Rightarrow p(x) \le p(y)$) then the triple (X, p, E) is called*lattice-normed vector lattice*, abbreviated as LNVL. In this talk, we present several notions related to LNVLs in parallel to the theory of Banach lattices. For a net (x_α) in a lattice-normed vector lattice (X, p, E) we say (x_α) is unbounded p -convergent to $x \in X$; if $p(|x_\alpha - x| \wedge u) \xrightarrow{o} 0$ for every $u \in X_+$. This convergence has been investigated recently for $(X, p, E) = (X, |.|, X)$ under the name of uo--convergence for $(X, p, E) = (X, \|.\|, R)$ under the name of un-convergence, and also for (X, p, R^{X^*}), where $p(x)[f] = |f|(|x|)$, under the name uaw-convergence. In this talk, we also give general properties of the unbounded p-convergence.

Keywords: vector lattice, lattice-normed vector lattice, p-convergence, up-convergence

On Properties of Differential Graded Module

Abdulsatar J. AL-Juburie, Andrew J. Duncan

Let K be a field of characteristic two and let $R = K[x_1, x_2, \dots, x_n]$ be a graded polynomial ring, graded in the negative way. Suppose M is a differential graded R-module with differential ∂ of degree P. We have constructed a classification for some types of differential graded R-module where ($P \leq -2, n > 1$). This classification gives a partial algorithm to test whether such modules are solvable. For modules outside the classification we cannot decide, using our methods, whether or not they are solvable. We have constructed an algorithm and written a **GAP package** to check whether the differential graded R-module M is solvable or not.

Coefficient bounds for subclasses of meromorphic bi-univalent functions defined by subordination

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Let $\sum$ denote the class of meromorphic univalent functionsf of the form
$f(z)=z+b_0+\sum_{n=1}^{\infty}\frac{b_n}{z^n}$ (1.1), defined on the domain $\Delta=\{z\in C;\quad 1<|z|<\infty\}$. It is well known that every function $f\in\sum$ has an inverse f^{-1}, defined by

$$f^{-1}\big(f(z)\big)=z,\quad z\in\Delta,\quad and\qquad f\big(f^{-1}(w)\big)=w,\quad M<|w|<\infty.$$

Furthermore, for $f\in\sum$ given by (1.1), the inverse map $g(w)=f^{-1}(w),$ has the following expansion $g(w)=f^{-1}(w)=w-b_0-\frac{b_1}{w}-\frac{b_2+b_0b_1}{w^2}+\cdots.\quad M<|w|<\infty.$ (2.1)

Function $f\in\sum$ is said to be meromorphic bi-univalent, if the inverse function f^{-1} also belongs to $\sum$. The class of all meromorphic bi-univalent functions will be denoted by $\sum_B$.
We say that f is subordinate to F, written as $f\prec F$, if and only if $f(z)=F(h(z))$ for some Schwarz function $h(z)$ such that: $h(0)=0,\quad |h(z)|<1$.

Let α,β,λ be real numbers such that $0\le\alpha<1<\beta,\quad \lambda\ge 1$. The function f given by (1.1) is said to be in the class $\sum_B(\alpha,\beta,\lambda)$, if the following conditions aresatisfied:

$$\alpha<\operatorname{Re}\left(\lambda\frac{zf'(z)}{f(z)}+(\lambda-1)\left(1+\frac{zf''(z)}{f'(z)}\right)\right)<\beta,\qquad (z\in\Delta)$$

$$\alpha<\operatorname{Re}\left(\lambda\frac{zg'(w)}{g(w)}+(\lambda-1)\left(1+\frac{wg''(w)}{g'(w)}\right)\right)<\beta,\qquad (w\in\Delta)$$

Where $g(w)=f^{-1}(w)$.

There are many choices of α,β,λ which reduce $\sum_B(\alpha,\beta,\lambda)$ to interesting subclasses of meromerphicbi-starlike functions which studied by Hamidi and Jahangiri, Panigrahi and others.

In this paper, we introduce and investigate an interesting subclass $\sum_B(\alpha,\beta,\lambda)$ of meromorphic bi-univalent functionsin Δ.Furthermore, we obtain the upper bounds for initial coefficients for functions in meromorphic bi-univalent functions by associated subordination. The results showed in this paperwould generalize and improve those in related works of several earlier authors.

Keyword(s): Meromorphic functions, Meromorphic bi-univalent functions, subordination
Acknowledgement: The authors are grateful to thank Shahrood University of Technology for supporting this project.

Coefficient estimates for a subclasses of analytic and bi-univalent functions by using positive functions

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Let A be a class of functions of the form $f(z) = z + \sum_{n=2}^{\infty} a_n z^n$, which are analytic in the open unit disk $U = \{z \in C; \quad |z| < 1$. Also$S$denotes the class offunctions $f \in A$ which are univalent inU. A function $f \in A$is said to be bi-univalent inU if both fand f^{-1} are univalent in U. Let $\sum$ denote the class of bi-univalent functions. Let the analytic functions $h, p : U \to C$ be soconstrained that $min\{Re$(h(z), Re(p(z)}>0 and h(0)=p(0)=1. Let $0 \le \gamma \le 1, \tau \in C - \{0\}$. A function $f \in A$ is said to be inthe class $S_{\Sigma}^{h,p}(\tau, \gamma)$, if the following conditions aresatisfied:

$$1 + \frac{1}{\tau}\left[(1-\gamma)\frac{f(z)}{z} + \gamma f'(z) - 1\right] \in h(U) \qquad (z \in U)$$

$$1 + \frac{1}{\tau}\left[(1-\gamma)\frac{g(w)}{w} + \gamma g'(w) - 1\right] \in p(U) \qquad (w \in U).$$

Where $g(w) = f^{-1}(w), \quad f\left(f^{-1}(w)\right) = w, \quad f^{-1}\left(f(z)\right) = z.$

There are many choices of h and p which reduce $S_{\Sigma}^{h,p}(\tau, \gamma)$ to interesting subclasses which studied by Frasin and Aouf, Srivastava and others. In this paper, we introduce and investigate an interesting subclass $S_{\Sigma}^{h,p}(\tau, \gamma)$of analyticandbi-univalent functions in the open unit disk U. Furthermore, we find upper bounds for the second and thirdcoefficients for functions in this subclass. The results presentedin this paper would generalize and improve some recent works.

Keyword(s): Analytic functions, Bi-univalent functions, Coefficient estimates.
Acknowledgement: The authors are grateful to thank Shahrood University of Technology for supporting this project.

Coefficient bounds for subclasses of meromorphic bi-univalent functions defined by Subordination

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In the present paper, we present two subclasses and of meromorphic univalent and meromorphic bi-univalent functions, respectively. Furthermore, we obtain the upper bounds for general coefficients for functions inmeromorphic univalent functions and initial coefficients for functions in meromorphic bi-univalent functions by associated subordination. The results showed in this paperwould generalize and improve those in related works of several earlier authors.

Keyword(s): Meromorphic functions, Meromorphic bi-univalent functions, subordination
Acknowledgement:The authors are grateful to thank Shahrood University of Technology for supporting this project.

On Trigonometric Approximation in weighted Lorentz Spaces Using Nörlund and Riesz Submethods

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In this study, we investigatetrigonometric approximation properties using Nörlund and Rieszsubmethods of partial sums of Fourier series of derivatives of functionsin weighted Lorentz spaces with Muckenhoupt weights.

One of the our main results is following.

Theorem: Let $\mathbb{T} \coloneqq [-\pi, \pi], 1 < p, q < \infty, w(\cdot) \in A_{p(\cdot)}, 0 < \alpha \leq 1, r \in \mathbb{N}$, and $(p_n)_0^\infty$ be a monotonic sequence of positive numbers such that

$$(\lambda_n + 1) p_{\lambda_n} = O\left(P_{\lambda_n}\right).$$

If $f \in W_{pq,w}^{r,\alpha}$, then we have

$$\left\| f^{(r)} - N_n^\lambda\left(f^{(r)}\right) \right\|_{pq,w} = O(\lambda_n^{-\alpha}).$$

In addition to this, we obtain similar theorem using Rieszsubmethod mean.

Keyword(s): Weighted Lorentz spaces, Nörlund and Rieszsubmethods,Muckenhoupt weights.

Trigonometric Approximation in weighted Variable Exponent Lebesgue spaces Using Matrix Submethods

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In this work, we study the approximation properties of the matrix submethods inweighted variable exponentLebesgue Spaces $L_w^{p(\cdot)}(\mathbb{T}), w(\cdot) \in A_{p(\cdot)}(\mathbb{T})$. Especially, we use matrix submethods of partial sums of Fourier series of functionsin weighted variable exponent Lebesgue Spaces with Muckenhoupt weights.

One of the our main results is following:

Theorem: Let $\mathbb{T} \coloneqq [-\pi, \pi], f \in Lip(\alpha, p(\cdot), w), 0 < \alpha < 1, p(\cdot) \in \wp_0(\mathbb{T}), w(\cdot) \in A_{p(\cdot)}$ and $A = (a_{\lambda_n,k})$ be a lower triangular matrix with $\left|S_{\lambda_n}^{(A)} - 1\right| = O(\lambda_n^{-\alpha})$. If one of the following conditions:

(i) $(a_{\lambda_n,k}) \in AMDS$ and $(n+1)a_{\lambda_n,0} = O(1)$,

(ii) $(a_{\lambda_n,k}) \in AMIS$ and $(n+1)a_{\lambda_n,r} = O(1)$, where r is integer part of $\frac{n}{2}$,

holds, then

$$\left\|f - T_n^{\lambda}\right\|_{p(\cdot),w} = O(\lambda_n^{-\alpha}).$$

In addition to this, we obtain similar theorem using Riesz submethod.

Keyword(s): Variable exponent weighted Lebesgue space, Muckenhoupt weight, Cesarosubmethod, trigonometric approximation.

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Approximation by Matrix Transform in Weighted Smirnov Classes with Variable Exponent

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Let $G \subset \mathbb{C}$ be a bounded Jordan domain, boundedbya rectifiable Dini-smooth Jordan curve Γ. Let $E_w^{p(\cdot)}(G)$ be a weightedSmirnovclassof analyticfunctionsfor a givenexponentfunction $p(\cdot)$, wheretheweight w satisfiesthe $A_{p(\cdot)}(\Gamma)$Muckenhouptcondition on Γ. If $f \in E_w^{p(\cdot)}(G)$,then f can be associatedtotheFaberseriesexpansion $f \sim \sum_{k=0}^{\infty} a_k F_k(z)$, where $F_k(z)$aretheFaberpolynomials of $\overline{G}$ and a_k, $k=0,1,2,\ldots$, areFabercoefficients of f .Let $S_n^G(f,z)$be $n-th$ partialsum of Faberseries of f, namely $S_n^G(f,z)=\sum_{k=0}^{n} a_k F_k(z)$ .We define thematrixtransform of $f \in E_w^{p(\cdot)}(G)$ suchthat $T_{n,G}^{(A)} := \sum_{k=0}^{n} a_{n,k} S_k^G(f,z)$ for a givenlowertriangularmatrix $A=(a_{n,k})$ withnonnegativeentries.Inthis talk wewilldiscussapproximationproperties of thematrixtransforms in $E_w^{p(\cdot)}(G)$ .When $\mathbb{T} := \{w \in \mathbb{C} : |w| = 1\}$, in theweightedLebaguespacewithvaribleexponent $L_w^{p(\cdot)}(\mathbb{T})$ similarproblemswereinvestigated in [1].

Keywords: Faber series, matrix transform, Variable exponent Smirmov classes

[1]D. M. Israfilov and Ahmet Testici, Approximation by Matrix Transform in Weighted Lebesgue Space with Variable Exponent, Results in Mathematics, 73 : 8, Issue 1, (2018). https://doi.org/10.1007/s00025-018-0762-4

A Probabilistic Approach to Appell Polynomials

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We show that the set A of Appell sequences is an abelian group under the binomial convolution. This is essentially equivalent to other approaches considered in the literature, in particular, the determinantal approach. We also consider three kinds of transformations T, R, L:A→A, namely: a scale transformation T, which is an isomorphism, a transformation R based on expectations with respect to a random variable Y and a forward difference transformation L, the last two of them being multipliers.

Using these tools, we give explicit expressions for any Appell sequence, its corresponding determinantal form, the Srivastava-Pintér addition theorem, and higher-order convolution identities for Appell polynomials. In this respect, the Stirling numbers of the first and second kind, as well as a suitable probabilistic generalization of these last numbers play a fundamental role. Attention is focused on the subset $E \subseteq A$ of Appell sequences whose generating function is given in terms of a real power of the moment generating function of a certain random variable Y. Various kinds of generalizations of the classical Bernoulli and Apostol-Euler polynomials, which belong to the aforementioned subset, are discussed in detail.

Keyword(s): Appell sequence, Binomial convolution, Transformation of Appell sequences, Generalized Stirling numbers, Srivastava-Pintér addition theorem, Generalized Bernoulli polynomials, Generalized Apostol-Euler polynomials

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A Result on the Behavior of Solutions of Third Order Linear Delay Differential Equations

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This paper deals with the behaviour of solutions for scalar third order linear delay differential equations. By the use of two distinet real roots of the corresponding characteristic equation, a new result on the behavior of the solutions is obtained.

Keyword(s): Delay differential equation, Characteristic equation, Roots, Asymptotic behavior

On the Behavior of Solutions in Mixed Differential Equations with Delays and Advances

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This paper deals with the behavior of solutions for scalar linear delay and advanced differential equations. Our results are obtained by the use of real roots (with an appropriate property) of the corresponding characteristic equation.

Keyword(s): Mixed differential equation, Characteristic equation, Roots, Asymptotic behavior.

STEM Instructors' Perceptions of STEM educations and Their Expectations Regarding to Skills Gained by Learners

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STEM (Science, Technology, Engineering, Mathematics) educations take the attention of researchers in recent years. There are different approaches on the content of these trainings and the skills required to be gained by these trainings. For this reason various opinions about the concept of "STEM" and the contents of STEM education and the skills expected to be given to the students through education can be seen in the literature. (Dugger, 2010, Eroğlu & Bektaş, 2016). The purpose of this study is to determine what is STEM and what is expected to gain students with STEM training, in the light of STEM instructors' opinions.

Focus group interview was used as data collection method. There are 4 teachers in the study group. These teachers are working as an "STEM and science center" trainer. The interview was directed by two lecturer as a moderator and as a moderator assistant. The interview lasted 65 minutes. The data were subjected to content analysis. The codes of participants' opinions on skills expected to be gained to students by STEM and STEM trainings were issued.

According to the findings from this study, three participants considered STEM as a general approach to problem solving and product development since it is a teaching method, one participant evaluated the present way as the method should be. The definition of STEM is based on the idea that it is a product-focused process requiring the blending of several disciplines provided active learning and the use of materials. Also it is expressed by the teachers in our study group that the student skills such as analytical thinking, producing different solutions, developing imagination, problem solving, creative thinking, working in cooperation, psychomotor skills can be developed during the STEM training.

As a result, in the modern teaching approaches, students are able to use different disciplines together and actively take part in the learning process. From this perspective, it can be said that STEM trainings are suitable for these approaches and that STEM trainings have a content that will respond to the 21st century skills.

Keyword(s): STEM, Skills, STEM instructors

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Investigation of Geometrical Justification Skill Levels of Middle School 7th Grade Students

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The aim of this research is to determine the levels of geometric justification skills of 7th grade students. It is also to show whether the level of justification of the students differs according to the score obtained in the multiple choice questions in the test of sex, school and achievement.

The sample of the research consisted of 250 seventh grade students, 123 girls and 127 boys from 4 different schools. The data were obtained from an analysis of the 4 questions for which the reasons for the answers in the Geometry Knowledge Test, composed of 14 questions, were prepared within the scope of a research project. The data have been analyzed descriptively. In the descriptive analysis, the framework given in Cai (2003) was used. The answers are coded as complete and convincing argument (3), vague or incomplete argument (2), incorrect or incomprehensible arguments (1) and no argument (0). Two points were obtained for each student, one for Geometry Knowledge Test and the other for Justification.

According to the findings obtained from the research, 15.2% of the students have no argument, 65.5% are vague or incomplete argument, 17.1% are incorrect or incomprehensible arguments and 2.2% are complete and convincing argument. There was no statistically significant difference between students according to -gender. That is, there is no significant difference between the mean scores of female students ($\overline{X}$= 4,39, Ss = 1,45) and the average scores of male students ($\overline{X}$= 4,13, Ss = 1,76). Similarly, there was no statistically significant difference compared to schools. A positive and statistically significant relationship was found between students' Geometry Knowledge Test achievement scores and justification scores. ($r=.173$; $n=250$; $p<.05$).

As a result, it is seen that the participants had a low level of complete and convincing argument justification skills and that the students with high level of achievement according to the statistical results had a high level of justification. As a result, students' answers to the questions can be interpreted as "ability to reason, to make conclusions, to make generalizations".

Keyword(s): Geometry, Justification, Student Success

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Structural Bifurcations Near a Free Surface Using Index Theory

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In this paper we study the structure and its evaluationof 2-D incompressible flows close to a viscous free surface.A rigorous theory has beendeveloped for degenerate streamline patterns and their bifurcation. The streamlines of a Hamiltonian vector field system are simplified by using the homotopy invariance of the index theory. Using a homotopy invariance of the index we develop a theory for the sufficient and necessary conditions for structural bifurcation.

Keyword(s): Structuralstability, divergence-freevectorfield, structuralbifurcation.

Flow Topology in an L-Shaped Cavity with Lids Moving in the Same Directions

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Flow development and eddy structure in an L-shaped cavity with lids moving in the same directions have been investigated using both tools from topological and numerical methods. In particular, structural bifurcation near a non-simple degenerate pointis investigated by making a local analysis of the velocity field based on a Taylor series expansion. The streamlines of a Hamiltonian vector field system are simplified by using the homotopy invariance of the index theory. A series of bifurcation curves are constructed to determine the sequence of flow structures by which eddies are generated in the L-shaped cavity.

Keyword(s): Structural stability, structural bifurcation, Bifurcations, FEM.

A Decision Making Method Using Simplified Neutrosophic Multiplicative Aggregation Operator

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The simplified neutrosophic multiplicative sets (SNMSs) are generalization of intuitionistic multiplicative sets (IMS) which can be used to handle uncertainty, imprecise, indeterminate, and inconsistent information in real life. SNMSs comprise simplified neutrosophic multiplicative numbers (SNMNs) which have three components that called as truth membership degree, indeterminacy membership degree and falsity membership degree. In this study, we introduce the simplified neutrosophic multiplicative set (SNMS), simplified neutrosophic multiplicative number (SNMN) and their operational laws. Following that we discuss the aggregation operations on SNMNs and the simplified neutrosophic multiplicative weighted geometric average (SNMWG) operator in particular. Besides, we study the basic properties of the geometric average operator. In the end, we give an example to see the application and determine the efficiency of SNMWG average operator in decision making.

Keyword(s): Simplified Neutrosophic multiplicative set, Decision making, Aggregation operator

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A Medical Diagnosis Approach Using a Simplified Neutrosophic MultiplicativeDistance Measure

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Due to the developing technology in medical area, the amount of information that physicians deal with increasingly continues. To manage this volume of information, various methods have been formulated for many years. Since the information obtained from each symptom might be true, false or indeterminate, simplified neutrosophic multiplicative sets (SNMSs) which consist of three components like the truth-membership, indeterminacy-membershipand falsity-membership functions, match perfectly while representing real life issues. The purpose of this study is to propose a distance measure between SNMS based on simplified neutrosophic multiplicative numbers (SNMNs) and solve medical diagnosis problems with simplified neutrosophic multiplicative information. For a patient that have some symptoms for a disease, a physician can find a proper diagnosis (make a decision) using proposed distance measure between symptoms and the related diseases presented by SNMNs. In this work a medical diagnosis problem is solved to indicate potency of the proposed distance measure.

Keyword(s): Simplified neutrosophic multiplicative set, Distance measure, Decision making

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Toxicity of urban air pollution: Artificial neural networks analysis

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It is well established that air pollution in urban areas is responsible for acute aggravations of health status or exacerbations of chronic pathologies that result in the occurrence of symptoms that can lead to hospitalization including, or even death. Thus a myocardial infarction, which is the translation of the obstruction of a coronary artery, constitutes an acute event, associated with immediate causes. This event can be precipitated by air pollution. Also, in the case of cumulative long-term exposure causes a process of calcification of the arterial walls (atherogenesis) or respiratory pathologies such as asthma attacks. In practice, exposure to atmospheric pollution is only evaluated through the concentration of some indicator pollutants. This assessment is expressed by particle levels according to the standards defined by the WHO ($PM_{2.5}$ and PM_{10} levels respectively below $10\mu g/m^3$ and $20\mu g/m^3$) as well as ozone. However, it is very difficult to assess the risk to public health given the varied vulnerability of the population. Complex factors come into play (exposure time, concentration of pollutants, individuals’ predisposition, age, gender, climatic conditions such as atmospheric pressure, wind speeds, temperature, precipitation, etc.). Mathematically analyzing such variables is very difficult. In this study, an artificial neural network model is applied in this analysis. Artificial neural networks are highly interconnected networks connecting two input-output spaces. Risk factors for public health are the input variables of the system. The rate of risk of disease by air pollution represents the output variable of the system. From the real recorded case data, the system constructs the transfer function in its learning phase. It then becomes possible to predict the impact of air pollution conditions on the health of the population.

Keywords. Air pollution, public health, climatic conditions, ANN

On the Solution Families of One Nonlinear Partial Differential Equation

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We consider a nonlinear partial differential equation of the fourth order

$$\frac{\partial^2}{\partial t^2}\left(\frac{\partial^2 u}{\partial x^2} - u\right) + \frac{\partial^2}{\partial t\,\partial x}\left(\frac{\partial u}{\partial x} - \left(\frac{\partial u}{\partial x}\right)^2\right) + \frac{\partial^2 u}{\partial x^2} = 0,$$

where$u$ is real-valued function depending on the one-dimensional spatial variable x and on the time variable $t > 0$. Nonlinear differential equations with third and fourth mixed derivatives are rather rare in the literature on exact solutions of nonlinear equations. However, they arise in the modeling of a number of different natural phenomena, and there are many investigations about the qualitative behavior of the solutions of these equations.

We construct 10 families of exact solutions of the given equation. Solutions are written out in explicit analytical form using elementary functions and special functions. The qualitative behavior of the constructed solutions is analyzed.

Keyword(s): nonlinear partial equations, exact solutions, blow-up of solutions
Acknowledgement: The research was supported by the Program for Support of Young PhDs (project no. MK-1829.2018.1),

On a Boundary Control Problems for 1-D Wave Equation

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In this talk we present the new approach for investigation the optimal boundary control problems for the one-dimensional wave equation

$$u_{tt} - u_{xx} = 0, \qquad 0 \leq \mathrm{x} \leq \mathrm{l}, 0 \leq \mathrm{t} \leq \mathrm{T}$$

in the case of damping-type boundary condition $u_x(l,t) = -qu_t(l,t)$ with an arbitrary constant parameter q. Our aim is to find a boundary control function which brings the oscillation process from any given initial state to any given final state. We investigate this problem in terms of a generalized solution from the Sobolev space of corresponding initial-boundary value problem. For any relatively large period of time T one can set an optimization problem, i.e. to find a control function which minimizes the boundary energy integral.

Keyword(s): wave equation, mixed problem, generalized solution, Sobolev space, boundary control
Acknowledgement: The investigation is supported by the Russian Scientific Foundation (project 16-11-10194).

Expressions and asymptotic expansions for Durrmeyer and composite Durrmeyer type operators

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We consider a generalized sequence of linear positive operators of Durrmeyer type in order to obtain differentiation formulas, expression for the moments and asymptotic expansion valid for many Durrmeyer modifications that appeared in the literature along the last years. We also apply our results for composite Durrmeyer operators for which we are able to offer the asymptotic description of the corresponding simultaneous approximation process.

Keyword(s): linear positive operator, Durrmeyer operator, asymptotic expansion
Acknowledgement: The author is partially supported by Junta de Andalucía Research Project FQM-178, by Research Projects DGA (E-64), MTM2015-67006-P (Spain) and by FEDER founds.

Oscillation and Stability of Recurrent Neural Networks

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A model describing dynamics of recurrent neural networks with time-delays isconsidered. By means of Lyapunov functional and differential inequality technique, criteria on existence, uniqueness and global exponential stability of the doubly weighted pseudo almost periodic solutions of the following model

$$\dot{x}_i(t) = -a_i(t)x_i(t) + \sum_{i=1}^{n} c_{ij}(t) f_j(x_j(t)) + \sum_{j=1}^{n} b_{ij}(t) g_j(x_j(t-\tau))$$
$$+ p_{ij}(t)\int_{-\infty}^{t} K_{ij}(t-s)h_j(x_j(s))ds + J_i(s),$$

are derived. At the end, some numerical examples with its simulations are presented to demonstrate the effectiveness of our results.

Keyword(s): Doubly weighted pseudo almost periodic,Time-delays, Global exponential stability,

Monotone iterative technique for non-autonomous semilinear differential equations with nonlocal condition

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In this work, we will apply monotone iterative technique to investigate the existence and uniqueness of mild solution for the following class of non-autonomous semilinear differential equations with nonlocal condition in an ordered Banach space X :

$$x'(\mathrm{t}) + \mathrm{A(t)\,x(t)} = \mathrm{f(t, x(t))}, \qquad \mathrm{t} \in J = (0, b],$$
$$x(0) = \sum_{k=1}^{p} c_k \; x(\mathrm{t}_k) + \mathrm{x}_0,$$

where $A(\mathrm{t}) : \mathrm{D(A(t))} \subset \mathrm{X} \to \mathrm{X}$ is a closed densely defined linear opeartor with $D(\mathrm{A(t)})$ is independent of t, and $-A(\mathrm{t})$ generates a semigroup of bounded linear operators on X , $f : J \times X \to X$ be given function satisfying certain assumptions , $0 < t_1 < t_2 < \ldots.. t_p < b, \quad p \in N$; $\mathrm{c}_k \neq 0 \; (\mathrm{k} = 1, 2, \ldots \mathrm{p}), \;\; \mathrm{x}_0 \in X$.

The result will be established under the assumption that the above system has lower and upper solutions, and by using measure of noncompactness and semigroup theory.

To the best of our knowledge, there is no work yet reported on existence and uniqueness of mild solution for non-autonomous semilinear differential equations via monotone iterative technique.

Keywords: Semigroup theory, monotone iterative technique, lower and upper solutions, measure of noncompactness.
Acknowledgement: The work of first author is supported by "Ministry of Human Resource Development, India".

Pattern Formation of Reaction-Diffusion Schnakenberg Model Using Trigonometric Quadratic B-spline Functions

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Numerical solutions of reaction-diffusion models are an interesting and challenging area of research. Studying solution of these models helps to capture patterns that occur as a result of chemical reactions. Schnakenberg model is a well known differential equation model which describes an autocatalytic chemical reaction. In this work Trigonometric Quadratic B-spline (T2B) based collocation algorithm with together Crack-Nicolson method has been set up to find one dimensionalreaction-diffusion equation system. Different patternsare simulated to show the solutions of the Schnakenberg Model by the proposed method. The pattern-forming parameters were selected from the literature to indicate accuracy.

Keyword(s): Schnakenberg Model, Trigonometric Quadratic B-spline, Reaction-Diffusion Systems

Wave Simulations of Gray-Scott Reaction-Diffusion System

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In this work we study the numerical simulation of one dimentional reaction diffusion system which is known as Gray-Scot model. This model is responsible for spatial pattern formation which we often meet in nature as reason of some chemical reactions.We have used Trigonometric Quartic B-spline (T4B) functions for space discretization and with Crack-Nicolson method fortime integration to solve nonlinear reaction-diffusion system. The solutions of the Gray Scott model are presented with different wave simulations. Test problems are chosen from the literature to illustrate the stationary waves, pulse splitting patterns and self replicating patterns.

Keyword(s): Gray-Scott Model, Trigonometric Quartic B-spline, Reaction-Diffusion Systems

Interdependence of ISE 30 and Gold Spot, Natural Gas, BrentOil: COPULA-GARCH Method

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This paper aims to examine the relationship between ISE 30 and gold spot, natural gas and brent oil with the COPULA-GARCH method. In the study, we use closing prices of ISE 30 and Gold Spot, Brent Oil and Natural Gas. The results show that there is a weak dependence between ISE 30 and Brent Oil, Gold Spot but there is more strong between ISE 30 and Natural Gas.

Keywords: ISE 30, COPULA-GARCH, Gold Spot, BrentOil, Natural Gas

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An Alternative Approach for Discriminant Analysis in the Presence of Outliers

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Discriminant analysis (DA) is a popular method that is beneficial for the solution of the classification problems. However,this method can produce results that do not accurately reflect the truth in the presence of outliers in the dataset.Due to DA's outlier sensitivity,the development of new and robust approaches is increasingly needed every day. In this study, we proposed to use estimates obtained bymultiple imputation (MI) instead of outliers in dataset as an alternative approach.Robust DAand DA based on estimatesobtained by MI instead of outliers werecompared with the results ofclassicalDAover the datasets withdifferent outlier ratios.

Keyword(s): Discriminant Analysis,Multiple Imputation, Outliers

Robust Sparse Principal Component Analysis in the Presence of Outliers

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The Principal Component Analysis (PCA) is the most important method usedfor reducing dimensionality and data processing in the high-dimensional datasets. For this reason, PCA is extensivelypreferred method by researchers. But, since all the original variables of each principal component in the PCA are linear combination, in most cases the interpretation phase of the results of PCA contains some difficulties. The methodwhich is usedto cope with these challenges are called as Sparse Principal Component Analysis (SPCA). However, SPCAis not robustwhen there are outliers in the datasets.Robust Sparse Principal Component Analysis (RSPCA)combiningthe excellentfeatures of SPCA and Robust Principal Component Analysis (RPCA).In this study, we examined the performance of RSPCA approach through several artificial datasets with different outlier ratios.

Keyword(s): Principal components,Outliers, Sparsity.

Evaluation of the polarization resistance (R_p) by potentiodynamic method of Magnesium and its Alloys in Aggressive Environment

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Magnesium presents indeed a low corrosion resistance [1, 2]. Moreover the behavior of this metal and its alloys is still poorly known in many corrosive environments which limit its applications. Magnesium is particularly sensitive to galvanic corrosion. The presence of impurities (Fe, Ni, Cu, Cr ...) in its matrix with potential higher than that of Magnesium promotes the reduction reactions, especially that of hydrogen and thus generates the galvanic corrosion of magnesium [1]. From its purity depends its resistance to corrosion. The use of alloying elements can improve the corrosion resistance of magnesium (and also themechanical properties). A beneficial effect of aluminum and manganese on the corrosion resistance of magnesium has been demonstrated [2]. The objective of this work was to evaluate the corrosion of Mg and its alloys by electrochemical method (potentiodynamic) in an aqueous solution of 0.5 M Na_2SO_4. the polarization resistance (R_p) can be evaluated

$$R_p = \frac{B_a * B_c}{2.3 * I_{corr} * (B_a + B_c)}$$

The curve for the untreated alloy is characteristic for the pitting process, where pits occur at potentials in the -1.98 to -1.4 V range.

The results obtained demonstrate that the corrosion resistance of magnesium AZ91 alloys can be significantly improved

Keywords: Evaluation1, potentiodynamic2 , pitting process3

An Artificial Neural Networks Model for Concrete in Plasticity

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A new approach is proposed to investigate the characteristics behavior of concrete under uniaxial and biaxial compression using the theory of plasticity. This approach is based on artificial neural networks (ANNs), especially radial basis function (RBF) in conjunction with the models of theory of plasticity.The main advantage of the proposed approach is to estimate the quality of the results with accuracy equivalent to the experiments. Another advantage of the proposed ANNs models are that it takes into account the uniaxial as well as the biaxial compression strain. The proposed models were evaluated against several experimental results available in the open literature for the behavior of the force and deformation of the two types of compression tests.Good agreement has been found between our models and those presented elsewhere.

Keywords: Models of theory of plasticity1, uniaxial/biaxial compression2; failure criteria3; artificial neural networks4.

Chaotic Examination in Gold Price: Maximum Lyapunov Exponent Test, Kolmogorov Entrophy test and Henon Map

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Precious metals are one of the main payment means and wealth indicators during all the time. Gold is probably the most important precious metal and take an important place in global economic system and trade both in 19th and 20th century.

With the evolution on mathematics and information technologies, most of the formidable problems became solvable especially with the help of computers. In this context, second half of 20th century is an age of illumination for physics, mathematics. Economists and econophysicists focused on understanding the change of the value of the precious metals. Before the quantum models and chaos, analysts used the linear models established by Newton physics but these models couldn't give proper and satisfying answers because of nonlinear structure of the data.

At this paper, we searched the presence of chaotic behavior at the daily gold price data from 29/12/1978 to 30/03/2018. We employed BDS test, maximum Lyapunov exponent Tests, Kolmogorov entrophy and Henon map. Firstly to determine chaotic behavior of daily gold price, BDS test was used. Following, maximum Lyapunov exponent Test, Kolmogorov entrophy test and Henon map given chaotic behaviour of gold price.

Keyword(s): Gold Prices, Chaos, Lyapunov, Kolmogorov Entrophy , BDS, Henon Map

Chaotic Behaviour in Exchange Rate

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Every science branch including mathematics, physics and economics etc. try to examine their data to make forecasts about the data.The Analysis ofthe data is important to understand the behavior and pattern of data. Different methods are employed to achieve the targeted goal. Economist and finance specialist focus on the FX time series for various reasons;understanding the position of the countries in world trade, searching suitable solutions to economic growth and even determining the financial behavior etc.In the literature, some papersuse to GARCH modelsbut these models faced some problems about the behaviour of data. In this paper, we aimedto figure out the chaotic characteristics of daily Euro/USD rates from 01/01/2004 to 03/04/2018. We employed BDS test, Henon Map and Lyapunov Exponents Tests. Firstly to determine chaotic behavior of daily Euro/USD rates, BDS test was used. Following, this structure was modelled by Lyapunov Exponents and Hennon Map. The findings confirm the existence of the non-linear and chaotic framework of daily Euro/USD rates.

Key Words: Exhange rate, Chaos, Lyapunov, Henon Map, BDS

Lyapunov’s Largest Exponent Test Results

Euro-USD Parity

	D=1	D=2	D=3	D=4	D=5
Max	0.907	0.328	0.859	0.471	0.972
	D=6	D=7	D=8	D=9	D=10
Max	0.906	0.331	0.864	0.458	0.968

According to results, all LLE’s are higher than zero so presence of chaos gained certainty.

Teaching Numerical Analysis with Mathematica and Maple

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For the last fifteen to twenty years, there has been wide exploration of innovative approaches to classroom instruction: the use of the computer and mathematics software in teaching science courses. The results of those explorations have proven that the use of the computer and mathematics software in teaching mathematics courses enhances the students' understanding. It is well known fact that students have difficulty understanding Numerical Analysis, when it is taught in the traditional way: with chalk and blackboard. The traditional method of instruction lacks the advantages of the latest computing technology to demonstrate the applications of the numerical methods in the real world.

In August 2017, the Department of Mathematics, Ferris State University started developing Mathematica and Maple software based computer lab projects for Numerical Analysis course to improve students' understanding of the course by using mathematical and scientific abilities of the latest technology. Mathematica and Maple software have been used to make the instruction platform more interactive and dynamic.

This talk is about the results of the development and implementation of the computing technology enhanced teaching platform for Numerical Analysis course. We will discuss advantages of designing computerized lab projects. We will share with the audience our experience of overcoming difficulties of the development and implementation of the Mathematica and Maple software based computer lab projects. We will talk about the advantages and disadvantages of the use of Mathematica and Maple software. At the end of the talk, we will discuss the results of the Mathematica and Maple software based computer lab projects at Ferris State University, Michigan, U.S.A.

Keyword(s): Numerical Analysis, Mathematica software, Maple software, Teaching Numerical Analysis
Acknowledgement: I would like to thank the Ferris State University's Sabbatical Leave Committee for their support in developing the new teaching platform for Numerical Analysis course.

Study of a Class Of Reaction-Diffusion System Resulting from Chemical Kinetics

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In this work, we are interested in modeling the evolution of chemical reactions in the form of reaction-diffusion system. Our interest relates to quantitative of formal chemical kinetics. The key quantity is that of the reaction rate. A numerical code has been produced allowing to take into account the various non-linearity.

Keyword(s): chemical kinetics, Mathematical modeling, Reaction rate, Reaction-diffusion system, Finite element method

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Study of Bioeconomic Model of a Fishery: the Linear Complementarity Problem

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The present work joins in a scientific context which returns within the framework of the modeling and of the mathematical and IT analysis of models in dynamics of populations. In particular, it deals with the application of the mathematics and with the computing in the management of fisheries. In this work, we define a bio-economic model in the case of two marine species whose natural growth is modeled by a logistic law. These two marine species are exploited by two fishermen. The objective of the work is to find the fishing effort that maximizes the profit of each fisherman by solving the linear Complementarity Problem using Nash equilibrium and taking into account constraints related to the conservation of biodiversity.

Keyword(s): Bio- economic, Mathematical Modeling, Fishery, Biodevesity, Nash Equilibrium, Linear Cmplementarity Problem

Monotone Iterative Technique by Upper and Lower Solutions with Initial Time Difference in Metric Spaces for Two Functions

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Recently,the study of set differential equations (SDEs) was initiated in a metric space and some basic results of interest were obtained. The investigation of set differential equations as an independent subject has somea dvantages. Forexample, when the set is a single valued mapping, it is easy to see that the Hukuharaderivative, and the integral utilized in formulating the SDEs reduce to the ordinary vector derivative and the integral. Therefore, the methodof lower and upper solutions coupled with the monotone iterative technique offers an effective and flexible mechanism to provide constructive existence results forn online arproblems. We develop the monotone iterative technique with initial time difference initial time difference in metric spaces for two functions.

Keyword(s): Monotone Iterative Technique, Upper and Lower Solutions, Metric Spaces.

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The Dirac equation solutions of the generalized symmetric Woods-Saxon potential energy in one spatial dimension

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We apply the two-component approach to the one-dimensional Dirac equation with the generalization of the Woods-Saxon potential energy by including the surface effects. Note that the surface effects can be attractive or repulsive, depend on the problem under investigation. We obtain the wavefunctionsfor the two-component spinor in terms of the hypergeometric function and the corresponding energy spectrum of the bound states .

The Bound-State Solutions of the Klein-Gordon Equation with a Scalar-Vector mixed Generalized Symmetric Woods-Saxon Potential Energy and the role of the differentiation parameter.

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The bound state solutions of a Klein-Gordon particle in the presence of mixed scalar-vector generalized symmetric Woods-Saxon potential are examined analytically within the framework of spin and pseudo-spin symmetries limit. We prove that a bound state energy spectrum exists only in the spin symmetric limit. Furthermore, we discuss how the constraints prohibit the confinement of a Klein-Gordon particle in the pseudo-spin symmetric limit. The differentiation parameter is called as the difference of the magnitudes of vector and scalar potential energy. We finally investigate its role on the determination of the energy spectrum density.

Cerebral tumor identification from an *MRI* image: Intelligent analysis

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The radiological aspect of brain tumors is most often suggestive of the diagnosis. However, the radiological presentation can be very variable and sometimes misleading. Moreover, other pathologies, tumoral or otherwise, may have a similar radiological presentation and which are essentially abscesses or inflammatory lesions. The problem is posed in the interpretation of the magnetic resonance imaging (*MRI*). In this context, the nature of tissues, which have a non-homogeneous structure, without apparent regularity, whose scheduling varies according to whether it is healthy or not. Particularly statistical methods are used due to the random nature of the tissues. This is to extract the characteristic parameters that will make it possible to diagnose and the nature and gravity of the tumor. These models are structural models (adapted repetition of macrostructures), models by probabilistic laws (for the analysis of microstructures) and since it is difficult to delimit the boundary between the zones of regularity and non-regularity, sometimes we call upon to analysis techniques by treating the data as a multi-fractal signal (turbulence signal analysis techniques). In view of this complexity, an artificial intelligence technique is proposed in this analysis of the texture resulting from *MRI* imaging. A fuzzy inference system is established. As fuzzy logic deals with uncertainty, its application in this area is adequate. The proposed system consists of four input variables (Texture nature, age, gender, genetic factor) and an output variable that expresses the degree of tumor confirmation. A rule base is established from the recorded values encompassing all possible combinations. The established algorithm permits to introduce randomly values on input factors of the system to read predict the degree of cerebral tumor confirmation.

Keywords. Tumor, Brain, *MRI*, fuzzy logic

A Mathematical Approach to Learning Problems

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This paper investigates the practical asymptotic stability of nonlinear impulsive systems. Stability theorem and converse stability theorem are established by employing the Lyapunov's second method. These theorems are used to analyze the practical asymptotic stability of the solution of perturbed impulsive systems and cascaded impulsive systems.

Keyword(s): Stability, Practical asymptotic stability, Perturbed impulsive systems, Cascaded impulsive systems, Lyapunov's Second methods.

Investigation of Teacher and Students in Secondary School Students from Arithmetic Processes and Algebra Processes

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The transition from arithmetic to algebra is a distressing process. Problems with algebra and equations will be eliminated if this transition process, which is the basic step for solving equations and further processing, is fully achieved. The study focuses on examining student and teacher behaviors in the context of the theoretical framework of didactic situations. The purpose of this study is to try to present conceptual tools that a teacher can use, not how it should be taught. The study enrolled 25 students from 6th grade in a junior high school in istanbul. The activities prepared in the context of the didactic situations in the study, the reactions of the students presented to the students, the difficulties that the teachers will live in are discussed and the solution proposal is discussed. It has been discussed how the activities will be applied in the light of didactic situations theory with the teacher, but the teachers have not been given any guidelines yet, and more attention has been paid to the teacher in the guiding role of the student-student interaction. As a result of the research, the teacher who did not have any information about the didactic situations was consulted at the end of the lessons about their thoughts and the interactions of the students. At the end of the course, five students were interviewed and ideas about the course were taken. When all the data of the study were examined, the results were reported at the end of the interviews with the results that the courses could be productive in accordance with the theory of didactic situations and student attitudes would be positive.

Keyword(s): Didactic Situation Theory, Algebra Transition, Mathematics Teaching

On the limit cycles of a class of generalized Liénard type differential systems

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We apply the averaging theory of first and second order for studying the limit cycles of generalized polynomial Liénard systems of the form

$$\begin{cases} \dot{x} = & y - l(x)y \\ \dot{y} = & -x - f(x) - g(x)y - h(x)y^2 \end{cases}$$

where $l(x) = \varepsilon l_1(x) + \varepsilon^2 l_2(x),\ f(x) = \varepsilon f_1(x) + \varepsilon^2 f_2(x),\ g(x) = \varepsilon g_1(x) + \varepsilon^2 g(x),\ h(x) = \varepsilon h_1(x) + \varepsilon^2 h_2(x\ )$, where $l_k(x)$ has degree m and $f_k(x),\ g_k(x)\ and\ h(x)$ have degree n for each k=1,2 and ε is a small parameter.

Keyword(s): Limit cycles, Liénard systems, Averaging theory,

Existence and Uniqueness Results of Some Problems with Caputo-Fabrizio Fractional Derivative

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In this paper, we study the existence and uniqueness of some problems for fractional differential equations using a new concept defined by Caputo-Fabrizio and applying classical fixed point theorems.

Keyword(s): Caputo-Fabrizio fractional derivative, Fractional differential equation, Fixed point theorems.

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On a Weighted Convolution Banach Subalgebra of the Weighted Space $L^1(G)$

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In this study, we define an intersection space between weighted classical Lebesgue spaces and an amalgam space with two weight functions. We consider the basic properties of the space such as Banach algebra, translation invariant, Banach module, a generalized type of Segal algebra. Moreover, we investigate several inclusions on this intersection space.

Keyword(s): Weighted Lebesgue spaces, Banach algebra, Inclusions.

On Some Embedding Properties of an Intersection Space

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In this study, we define an intersection space between weighted classical Lebesgue spaces and weighted variable exponent Sobolev spaces. Also, we consider some continuous and compact embeddings under some conditions. Moreover, we investigate several inclusions and comparisons with other defined weighted variable exponent Lebesgue spaces.

Keyword(s): Compact embedding, Weighted variable exponent Sobolev spaces, Weighted Lebesgue spaces.

Monotone Iterative Technique by Upper and Lower Solutions with Initial Time Difference for Three Functions in MetricSpaces

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Multivalued differential equations known as set differential equations (SDEs) generated by multivalued differential inclusions have been introduced in a semi-linear metric space,consisting of all nonempty, compact, convex subsets of an initial finite or infinite dimensional space. The investigation of set differential equations as an independent subject has some advantages. For example, when the set is a single valued mapping, it is easy to see that the Hukuhara derivative, and the integral utilized in formulating the (SDEs) reduce to the ordinary vector derivativeandthe integral. Therefore, themethod of lower and upper solutions coupled with the monotone iterative technique offers an effective and flexible mechanism to provide constructive existence results for nonlinear problems. we develop the monotone iterative technique with initial time difference for threefunctions in metricspaces.

On the Behavior of Solutions of Second Order Linear Autonomous Delay Differential Equations

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In this paper, our aim is to establish a new result for the solutions to second order linear delay differential equations with constant coefficients and constant delay.We used two different real roots of the corresponding characteristic equation. So we obtained a new result on the behavior of the solutions.

Keyword(s): Delaydifferentialequation, Characteristicequation, Roots,Asymptoticbehavior.

On the Stability in Functional Differential Equations of Neutral Type

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The purpose of this study is to investigate the stability behaviour of the solutions of the linear functional differential equation of neutral type. The asymptotic behavior of the solutions and the stability of the trivial solution are described by the use of an appropriate real root of an equation, which is in a sense the corresponding characteristic equation.

Keyword(s): Asymptotic behavior, Functional differential equation, Neutral, Characteristic equation.

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On Weighted Inverse Rayleigh Distribution

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This study provides a weighted version of inverse Rayleigh distribution having two different weight functions. The certain statistical and reliability properties of this distribution are obtained. The estimating equations are given to obtain maximum likelihood estimates of individual parameters, and Fisher information matrix is derived for obtaining approximate confidence intervals of parameters. To illustrate the applicability of the proposed distribution against the inverse Rayleigh distribution, a real data set has been analyzed.

Keyword(s): Weighted distribution, Shannonentropy, Fisher information matrix.

Some Properties of the Doubly-Truncated Exponentiated Inverse Weibull Distribution

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In this study the doubly-truncated exponentiated inverse Weibull distribution is introduced. The basic statistical and reliability properties of this distribution including the moments, moment generating function, survival and hazard rate functions are derived. The performances of the estimators of maximum likelihood, least square and weighted least square for unknown parameters are compared the by using the Monte-Carlo simulation study. Finally, a real data example is presented to show the usability of the distribution.

Keyword(s): Doubly-truncated distribution, Maximum likelihood, Monte-Carlo simulation.

Ortaokul Matematik Öğretmenlerinin Matematik Derslerindeki Değerler Eğitimine Yönelik Görüşlerinin İncelenmesi

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Bilim ve teknolojideki gelişmeler beraberinde birçok alanda olduğu gibi eğitimde de değişimi zorunlu hale getirmiştir. Çünkü artık eğitimin amacı sadece öğrencilerin okullarda bilgi ve beceri sahibi olmaları değil, aynı zamanda onları topluma faydalı bireyler olarak yetişmelerini sağlamaktır. Bu amaç doğrultusunda öğretim programları da güncellenmiştir ve öğretim programlarında artık belli bir disipline ilişkin kazanımlara yer verilmesinin yanında değerler eğitimine de yer vurgu yapılmıştır. Matematik dersi bakımından ele alındığında ilkokul ve ortaokul matematik öğretim programlarının 2017 ve 2018'deki güncellenen şekillerinde matematik öğretiminin amaçları arasında manevi ve kültürel değerlere sahip bireylerin yetiştirilmesine yer verilmiş, değerler eğitimin önemine ve kazandırılması gereken değerlerin neler olduğuna değinilmiştir. Güncellenen bu değişimle ilgili olarak ortaokul matematik öğretmenlerinin görüşlerini almak, değerler eğitiminin sürdürülebilirliği açısından oldukça önemlidir. Dolayısıyla bu çalışmanın amacı ortaokul matematik öğretmenlerinin matematik derslerindeki değerler eğitimine yönelik görüşlerinin incelenmesidir. Bu amaçla yapılan çalışmada nitel araştırma yöntemlerinden biri olan olgu bilim deseni kullanılmıştır. Çalışmaya amaçlı örnekleme yoluyla seçilen 10 ortaokul matematik öğretmeni katılmıştır. Veri toplama aracı olarak 10 açık-uçlu sorudan oluşan anket kullanılmıştır. Verilerin analizi içerik analizi ile analiz edilmiştir. Elde edilen bulgulara göre öğretmenlerin değerler eğitiminden haberdar oldukları ancak bununla ilgili gerek hizmet içi gerekse hizmet öncesi bir eğitim almadıkları tespit edilmiştir. Öğretmenler, matematik derslerinde değerlere yer verirken sabır, dürüstlük gibi bazı değerlerin öğretilmesinde zorluk yaşadıklarını belirtmişlerdir ve değerler eğitimiyle ilgili öğretmenlerin bilgilendirilmesi gerektiğini, öğretim programında kazanımlara ilişkin değerlerin daha detaylı olması gerektiğini, sadece matematik derslerinde değil ayrıca bir ders olarak verilmesi gerektiğini vurgulamışlardır.

Keywords: Değerler Eğitimi, Matematik Öğretimi, Ortaokul Matematik Öğretmenleri

Nonlinear Bright Solitary SH waves in a Heterogeneous Layer Overlying a Rigid Substratum

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This work investigates the propagation of nonlinear shear horizontal (SH) waves in a layer of finite depth overlying a rigid substratum. We assume that the layer consists of heterogeneous, isotropic, and incompresibble hyper elastic materials. If the materials are homogeneous, isotropic, and compresibble, see the work [1]. By using the method of multiple scales [2], we show that the self-modulation of nonlinear SH waves is governed by the nonlinear Schrödinger (NLS) equation. Using known properties of NLS equation, we find that bright solitary SH waves can exist depending on the nonlinear constitution of the layer. Consequently, not only the effect of heterogeneity but also the effect of the nonlinearity on the deformation field is considered for these waves.

Keyword(s): SH waves, Heterogeneous layer, Rigid substratum

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Analysis of Engineering Elasticity Problems by Finite Elements Based on the Strain Approach

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The finite element method is the most practical tool for the analysis of structures whatever the geometrical shape, applied loads and behavior. In addition, practice shows that engineers prefer to model their structures with the simplest finite elements. Also, in the numerical analysis, it is well known that according to the choice of the interpolation field, several models of finite elements can be used and with a good displacement pattern, convergence towards the correct value will be much faster than with a poor pattern, thus resulting in saving of the computing time. In this paper, the procedure of the development of finite elements based on the strain based approach (S.B.A) is described. Through some applications and validation tests; using some membrane elements,recently-developed, an excellent convergence can be obtained when the results are compared with those given by corresponding displacement-based elements.

Keyword(s): Elasticity Problems, Finite Element Method, Membrane Elements, Strain Based Approach.,

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More Advanced Finite Elements for the Analysis of Rectangular and Circular Plates

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Numerical analysis of structures composed of plates with different geometrical shapes and openings becomes a very practical tool in engineering problems, whatever the applied loads, thickness and boundary conditions. The most method used is the finite element which is well known and with a good displacement field, the convergence towards the correct value will be much faster than with a poor one. In this paper, some applications and validation tests, using recently developed plate bending and solid finite elements based on the strain approach are presented. İn addition, a new developed sector plate bending element is applied to the analysis of thin circular plates with opening instead of using quadrilateral elements as approximation for curved surface. Good results have been observed when compared with those given by the corresponding displacement based elements. According to the results obtained, the efficiency and performance of the strain based finite elements in modeling plate bending is demonstrated.

Keyword(s): Circular plate, Finite Element Method, Plate bending, Sector Element, Strain Based Approach.

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On the maximum modulus of polynomial and its derivative in a complex domain

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Let P(z) be a polynomial of degree n, then according to a famousresult known as Bernstein's inequality on the derivative of apolynomial, we have

$$\max_{|z|=1} |P'(z)| \leq n \max_{|z|} |P(z)|. \quad (1.1)$$

The result is best possible and equality holds for thepolynomials having all its zeros at the origin.
For polynomials having allits zeros in $|z| \leq 1$, then it was proved by Turanthat

$$\max_{|z|=1} |P'(z)| \geq \frac{n}{2} \max_{|z|=1} |P(z)|. \quad (1.2)$$

With equality for those polynomials, which have all their zeros on |z|=1.
As an extension of (1.2) Jainused the parameter β and proved that if P(z) is a polynomial of degree nhaving all its zeros in $|z| \leq 1$ then for any real or complex number β with $|\beta| \leq 1$, we have

$$\max_{|z|=1}\left|zP'(z) + \frac{n\beta}{2} P(z)\right| \geq \frac{n}{2}\left[\left(1 + \operatorname{Re}\beta\right)\max_{|z|=1} |P(z)| + \left(|1 + \operatorname{Re}\beta - |\beta||\right)\min_{|z|=1} |P(z)|\right] .$$

(1.3)
In In this paper, we generalize the inequality (1.3).
Precisely we prove that if P(z) is a polynomial of degree n having all its zeros in $|z| \leq k$, where $k \leq 1$ then for any real or complex number β with $|\beta| \leq 1$, we have

$$\max_{|z|=1}\left|zP'(z) + \frac{n\beta}{1+k} P(z)\right| \geq \frac{n}{1+k}\left[\left(1 + \operatorname{Re}\beta\right)\max_{|z|=1} |P(z)| + \left(|1 + \operatorname{Re}\beta - |\beta||\right)\min_{|z|=k} |P(z)|\right].$$

The result is best possible and equality holds for thepolynomials $P(z) = a(z+k)^n$ and $\beta \geq 0$.

Keyword(s): Polynomial, Inequality, Maximum modulus, Derivative, Rrestricted zeros.
Acknowledgement: The authors are grateful to thank Universityof Semnan for supporting this project.

Some properties of maximum modulus of derivative polynomials

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Let P(z) be a polynomial of degree n, then according to a famousresult known as Bernstein's inequality on the derivative of apolynomial, we have

$$\max_{|z|=1} |P'(z)| \le n \max_{|z|} |P(z)|. \quad (1.1)$$

The result is best possible and equality holds for thepolynomials having all its zeros at the origin.

For polynomials having no zeros in |z|<1, Erdos conjectured and later Lax proved that if P(z) does not vanish in|z|<1, then (1.1) can be replaced by

$$\max_{|z|=1} |P'(z)| \le \frac{n}{2} \max_{|z|=1} |P(z)|. \quad (1.2)$$

With equality for those polynomials, which have all their zeros on |z|=1.

As an extension of (1.2) Malik proved that if P(z) does not vanish in|z|<k, $k \le 1$ then

$$\max_{|z|=1} |P'(z)| \le \frac{n}{1+k} \max_{|z|=1} |P(z)|. \quad (1.3)$$

Further, as a generalization of (1.3) Govil proved that forP(z) having no zeros in |z|<k, $k \le 1$ if |P'(z)| and |Q'(z)| becomes maximum at the same point on|z|=1, then,

$$\max_{|z|=1} |P'(z)| \le \frac{n}{1+k^n} \max_{|z|=1} |P(z)|.$$

In In this paper, we obtain a similar result for general polynomials and obtain a refinement of above inequality.

Keyword(s): Polynomial, Inequality, Maximum modulus, restricted zero.
Acknowledgement: The authors are grateful to thank University of Semnan for supporting this project.

On Matched Triples of Group(oid)s

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Groupoids were introduced by Brandtal so known as virtual groups. A group-like approach to the groupoid is a category C with objects set C_0 and morphisms set C_1 in which each morphism is invertible. These structures are useful in variety of mathematics. In a brief note, Brown introduced a geometric approach to double groupoids. Later, Majard generalised this concept for n-tuplegroups. In this work, following Brown, we investigate this situation for triple groupoids, diagramatically.

Keyword(s): Category Theory, Matched pairs, Matched triples,

Coproduct of 2-Crossed R-Modules of Algebras

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Crossed modules were initially defined by Whitehead as an algebraic model for homotopy connected 2-types. Acoproductobject in thecategory of crossedmodulesover a group R is givenbyBrown, HigginsandSiviera.Inthisworkit is shown how toobtainfinitecoproducts in thecategory of 2-crossed R-modules. One of theimportantcategoricalconstructions is colimit. Weshowtheexistence of finitecolimits ofthecategory of 2-crossed R-modulesof algebras. Wegiveexplicitdescriptions of theinducedfunctoralong a morphism of crossed R-moduleswhichareusedtobuiltthecoproduct of 2-crossed R-modules

Keyword(s):2-Crossed Module, Category Theory, Crossed Module, coproduct

Rationals on horocycles on the surface of the unit tangent bundle

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In this presentation, we focus on rational points on the closedhorocycles on the surface of the unit tangent bundle and study their equdistribution problem.We have already knownthat the long closed horocycles are equidistributed on the modularsurface and its tangent bundle. We investigate the distribution of rational points on such horocycles on the unit tangentbundle surface SL (2, Z) \SL (2, R).

Keyword(s): Distribution, horocycle on the unit tangent bundle, Kloosterman sums

Rationals on long closed horocycles on the modular surface

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In this study, we investigate the distribution theorem of rational points on the closedhorocycles. Sarnak proved that the long closed horocycles are equidistributed on the modularsurface. We embed rational points on such horocyles on the modular surface and study their distribution problem.

Keyword(s): Long closed horocycles, distribution, Kloosterman sums

Some new mean value theorems for the intermediate point of the integral calculus

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By considering the functions $f, g\colon [a,b] \to \mathbb{R}$ with the properties:

- (a) the functions f and g are continuous on $[a,b]$,
- (b) the function f is decreasing on $[a,b]$,
- (c) $f(x) \geq 0$, for all $x \in [a,b]$,

one has that there exists a point $c \in [a,b]$ such that

$$\int_a^b f(x)g(x)dx = f(a)\int_a^c g(x)dx.$$

We study the approaching of the point c towards a, when b approaches a, and some new results follows.

Keyword(s): intermediate point, mean-value theorem, derivative.

Bi-Periodic Balancing Numbers

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In this study, we introduce a new generalization of the balancing numbers which we call bi-periodic Balancing numbers as

$$b_n = \begin{cases} 6cb_{n-1} - b_{n-2}, & if\ n\ is\ even \\ 6db_{n-1} - b_{n-2}, & if\ n\ is\ odd \end{cases} \vdots\ n \geq 2$$

withinitialconditions$b_0 = 0,\ b_1 = 1$. The classic balancing numbers is a special case of $\{b_n\}$ withc = d = 1. If we setc = d = k, for any positive number, we get the k-balancing numbers. We find the generating function for this sequence andproduce a Binetformula.

Keyword(s): Balancing numbers, Generating functions, Binet formula

The extended transformed rational function method for some nonlinear evolution equations

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In this work, we study complexiton solutions to a (2+1)-dimensional Sawada.Kotera (SK) equation and a (3+1)-dimensional nonlinear evolution equation. The complexiton solutions are combinations of trigonometric function waves and exponential function waves. For this goal, the extended transformed rational function method is carried out which is based on the Hirota bilinear forms of the considered equations and provides a systematical and convenient tool for constructing the exact solutions of nonlinear evolution equations. This scheme unifies the well-known approaches such as the tanh function type methods, the homogeneous balance method, the exp-function method, the mapping method, and the F-expansion type methods.

Keywords: Extended transformed rational function method, Complexiton solutions, Hirota bilinear form, Symbolic computation.

On the optical solitons with spatio-temporal dispersion in (2 + 1)-dimensions

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In this work, we derive optical soliton solutions to perturbed nonlinear Schrödinger's equation with spatio-temporal dispersion in $(2 + 1)$-dimensions by the extended Kudryashov method which takes full advantages of the Bernoulli and Riccati equations to construct optical soliton solutions. There are four types of nonlinear fibers studied in this paper. They are quadratic–cubic law, anti-cubic law, cubic–quintic–septic law and triple-power law nonlinearity. With performing this algorithm, dark soliton, singular soliton and rational soliton are deduced. These solitons are important in optics. Besides, singular periodic solutions are revealed as a consequences of this approach and these are also listed.

Keyword(s): Solitons, Perturbation, Extended Kudryashov's method

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Solutions for a nonlinear fourth order boundary value problem with integral boundary conditions on an infinite interval

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The existence of the solutions of a nonlinear fourth order three point differential equation with integral boundary conditions is proved in this work by applying Schauder's fixed point theorem and the upper and lower solution method on an infinite interval. An example is given to demonstrate of our result.

Keyword(s): fourth order, three point, integral boundary
Acknowledgement: This research is supported by Ege University, Scientific Research Project (BAP), Project Number: 2015 FEN 070.

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On Global Asymptotic Stability of Neural Networks with Varying Delays

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Using suitable Lyapunovfunctionals, for global asymptotic stability of neural networks with varying delays some new sufficient conditions are given. The conditions obtained contains and improves some of the previous results in the references.

Keyword(s): Global Asymptotic stability, Lyapunovfunctionals

Global asymptotic stability for differential equation systems of neural networks With delays

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In this study, we give sufficient conditions for the globalasymptotic stability of the equilibrium point of a certain integro-differential systems modeling neural networks with time-varying delays. Proper Lyapunovfunctionals and some analytic techniques are employed to derive the sufficient conditions under which the networks proposed are the global asymptotic stability. The results have shown to improve the previous global asymptotic stability results derived in the literature.

Keyword(s): Lyapunovfunctionals, Global asymtotic stability

Braided Crossed Modules and Reduced Quadratic Modules of Associative Algebras

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Crossed modules defined by Whitehead are algebraic models for topological2-types and quadratic modules were defined by Bauesas models for algebraic 2-types.As an alternative model, the notion of braided regular crossed modules of groupoids was introduced by Brown and Gilbert. In this work we will give the relationships between braided crossed modules of algebras and some algebraic structures, for example simplicial algebras and reduced quadratic modules of algebras by using $F_{\alpha\beta}$ functions in the Moore complex of a simplicial algebra.

Keyword(s): BraidedCrossedmodule,CategoryTheory, QuadraticModule, Simplical Algebra

On Free Quadratic Modules of Lie Algebras

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Crossed modules of lie algebras was introduced by Kassel and Loday. Simplicial groups first studied by Kan have a well structured homotopy theory and they model all homotopy types of connected spaces.In this work we give the notion of free quadratic module for Lie algebras and explore the connections between this structure and free simplicial Lie algebras in terms of hypercrossed complex pairings

Keyword(s): CategoryTheory,LieAlgebra, QuadraticModule

Generalized Boolean Sum Operators of Bivariate (p,q)-Balazs-Szabados Operators

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We intoduce a bivariate operators of (p,q)-Balazs-Szabados operators and obtain the degree of approximation for these operators in terms of the partial moduli of continuity, the complete modulus of continuity and the Lipschitz class functions. Also, we construct the generalized Booleansum (GBS) operators of bivariate (p,q)-Balazs-Szabados operators in terms of the mixed modulus of smoothness and the Lipschitz class of Bögel continuous functions

Keyword(s): Balazs-Szabadosoperators,(p,q)-calculus, rate of convergence

Approximation by Kantorovich Type q-Balazs-Szabados Operators

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We introduce Kantorovich type q-Balazs-Szabados operators called q-BSK operators. We give weighted statistical approximation theorem and the rate of convergence of the q-BSK operators with the help of the weighted modulus of smoothness. Moreover, we investigate the local approximation results. Further, we give some comparisons associated the convergence of q-BSK operators.

Keyword(s): Balazs-Szabadosoperators,q-calculus, rate of convergence,Peetre's K-functional

Complete Growth Series of Some Types of Amalgamated Free Product of Groups

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In this work, by considering rewriting system procedure,we obtained complete rewriting systems of some types of amalgamated free product of groups. This complete rewriting system is important in respect to find normal forms of elements of given algebraic structure and thus have a solvable word problem. With the help of these complete rewriting systems,we attained normal form of elements of each group structures. At the last part of the work, we investigated complete growth functions and calculated complete growth series of these groups by using complete rewriting systems of them.

Keyword(s): Rewriting System, Normal Form, Complete Growth Series, Amalgamated Free Product

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Decision Problems and Word Problem for Derivations of Crossed Product of Groups

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In this work, firstly, we give some information on decision problems, which is introduced by Max Dehn in 1911 and word problem, which is one of three decision problems[1]. Secondly, by considering crossed product construction from view of Combinatorial Group Theory, we give some derivations of this product, which is called two-sided crossed and iterated crossed product of groups. Then,by giving some conditions for these products to be a group, we obtain presentations for derivations of crossed product of cyclicgroups. Finally, by using these presentations, we find complete rewriting systems and thus obtain normal forms of elements which gives solvability of the word problem for these products [2,3,4].

Keyword(s): Word Problem, Rewriting System, Crossed Product
Acknowledgement: This work was supported by the Scientific Research Fund of Karamanoğlu Mehmetbey University (BAP) Project No: 17-M-16 and Project No: 16-YL-15.

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Comparison of Weighted K-Means Clustering Approaches

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K-means clustering algorithm is widely used in various area such as machine learning, pattern recognition and image processing.In this algorithm, a given data with*n*objects is partitionedinto *K*different clusters, whichare represented with thenearestcenters. New centers are computediteratively and each data isre-assigned to these centers untilit converges, in other words, until no change is made. Althoughthis approach is effective for clustering data, it sometimes can converge to a localoptimum instead of global optimum.In this clusteringmethod, importance of each data is the same in the computation of cluster centers.However, data points can represent varying densities in the real world data sets.Therefore, weighted K-means algorithms have been developed by considering weight values associated with datapoints. The main idea behind the weighted K-means algorithms is to give less weight to the variables that have been affected by significant noise.In this work, a comparative evaluation on weighted K-means approaches has been performed. It has been observed that weighted K-means clustering can provide efficient results in case of non-homogenous data by suppressing noise. Also, weighted K-means algorithm presents successful results on non-sphericalcases by transferring the non-spherical space into a spherical space using appropriate weight values. However, weighted K-means methods are generally unable to find stable weight values. Although weighted K-Means algorithms usefeatures, which are cluster-dependent, those features are usually treated as if they were a homogeneous feature space.

Keyword(s): K-means, Clustering, Feature weighting

On The Importance of Batch Size for Deep Learning

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Deep learning has been applied in several areas such asimage processing, computer vision, data mining and vehicular networks.Training of deep learning networks is usually provided by stochastic gradient descent.The iterative optimization approach minimizes the given objective function using batch samples taken from data sets. Batch size has an important role in this optimization technique. Because, parallelization of stochastic gradient descent in deep learning is limited in case of small batch sizes and sequential iterations.To solve this problem, large batch sizes are used. However, increasing the batch size increases computational cost. Also, the performance of the deep learning based methods on test data sets decreases (in other words, loss/gap in generalization occurs) when large batch size is used. In this work, the reason for the poor generalization has been investigated with experiments. It has been observed from numerical results that there is a correlation between the performance of the generalization and the sharpness of minimizers generated from approaches with large batch size. Large batch sizes lead to converge to sharp minimizers of training functions while small batch sizeslead to converge flat minimizers because of the noise in gradient estimation.

Keyword(s): Batch size, Deep learning, Stochastic gradient descent

On Bivariate Fibonacci and Lucas Quaternion Polynomials

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Quaternions have great importance as they are used in quantum physics, applied mathematics, graph theory and differential equations. Subsequently many authors studied the extension and generalization of the Fibonacci quaternion and investigated their properties. In this study, we consider bivariate Fibonacci quaternion polynomials and also bivariate Lucas quaternion polynomials which are defined by bivariate Fibonacci quaternion polynomials and bivariate Lucas quaternion polynomials. Generating function, Binetformulas, Catalanidentity, Cassini'sidentity, d'Ocagnesidentityareobtained. Moreover we deduce various kind of sums for these quaternion polynomials and also binom formulas includes bivariate Fibonacci quaternion polynomials and bivariate Lucas quaternion polynomials.

Keyword(s): Bivariate Fibonacci polynomials, Quaternions, Binet formulas

(p,q)- Bivariate Chlodowsky Variant of Bernstein Schurer operators

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Approximation theory becomes a key instrument not only in classical approximation theory but also in other fields of mathematics such as differential equations, orthogonal polynomials and geometric design. Since Korovkin's famous theorem was first published in 1950, the issue of approximation by linear positive operators has become increasingly important area as part of approximation theory.

In the past two decades, the applications of q-calculus in approximation theory have been studied extensively. Firstly, the Bernstein polynomials based on q-integers was done by Lupaş. As approximation of q-Bernstein polynomials studied by Lupaş is better than classical one under convenient choice of q, many authors introduced q-generalization of many operators and examined several approximation properties.

In this studywe define the two dimensional Chlodowskyvariant Bernstein Schurer operators based on (p,q)-integers. We examine approximation properties of our new operator by the help of Korovkin-type theorem. In addition, we present the local approximation properties and establish the rates of convergence by means of the modulus of continuity and the Lipschitz type maximal function. Also, we give a Voronovskaja type theorem for this operators. Another important aim of this study is to examine weighted approximation properties of our operators

Keyword(s): Bernstein--Cholodowsky--Schurer operators, Voronovskaja type theorem, rate of convergence

Solutions for a nonlinear fourth order boundary value problem with integral boundary conditions on an infinite interval

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The existence of the solutions of a nonlinear fourth order three point differential equation with integral boundary conditions is proved in this work by applying Schauder's fixed point theorem and the upper and lower solution method on an infinite interval. An example is given to demonstrate of our result.

Keyword(s): fourth order, three point, integral boundary
Acknowledgement: This research is supported by Ege University, Scientific Research Project (BAP), Project Number: 2015 FEN 070.

Compact Operators on Some Fractional Banach Spaces

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An FK space whose topology is normable is called a BK space. The domain Xof an infinite matrix A in a sequence space X is defined by $\mathbf{X}_A = \{x = (x_k) \in \omega : Ax \in \mathbf{X}\}$which is a set of sequences.If X and Y are subsets of ω, then (X, Y) denotes the class of all matrices A that map Xinto Y. It is known that if X and Y are FK spaces, then each $A \in (X, Y)$ defines a continuous linear operator $L: X \to Y$ with $Lx = Ax$; if X has AK then every linear operator $L: X \to Y$ is given by a matrix $A \in (X, Y)$ such that $Ax = L(x)$.

The gamma function of a real number x (except zero and the negative integers) is defined by an improper integral. The fractional difference operator for a positive fraction α have been defined in [1] as

$$\Delta^{(\alpha)}(\rho_k) = \sum_{i=0}^{\infty} (-1)^i \frac{\Gamma(\alpha+1)}{i!\Gamma(\alpha-i+1)} \rho_{k-i}. \tag{1.1}$$

It is assumed that the series defined in (1.1) is convergent.

In this study, we consider fractional operators, the sets of fractional difference sequences and their properties. We will establish some identities or estimates for the Hausdorff measure of noncompactness of certain operators on some fractional difference sequence spaces. We conclude the study with some results about the compact operators on fractional Banach sets.

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Keyword(s): mixed norm space, mixed paranorm space,

On some pseudo-parallel submanifolds of S-space forms

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The purpose of this note is to studied the Legendrian submanifolds of an S-space form. In particular, we studied the pseudo-parallelism (resp. Ricci generalized pseudo-parallelism) of a Legendrian submanifolds with flat normal bundle of an S-space form.

Keyword(s): Legendrian submanifolds, Pseudo-parallel, S-space form.

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A Robot Vision System

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The human vision system is to be able to perceive and identify objects that are in front of a person with all reality.Vision is the huge part of human being.Computer vision is to load the human vision system to the computer.So the computer will be able to identify the object when it sees an object.Most common computer vision examples are face recognition and object detection.

In recent years robotic field has become an important research area.The robots started to behave like human beings.In this work, face detection and recognition algorithms will be applied to a robot. Main purpose of the work is the robot will recognize the faces from objects they see within a certain distance and recognize the owners of those faces. This will increase the interaction between human and robot. K-means clustering algorithm will be used for finding faces within a certain distance.

As a result of this work,the robot will recognize human when it sees a person within close distance.

Keyword(s): Vision, Clustering, Face detection,Face recognition

Applying Dimension Reduction to Hyperspectral Data with Manifold Learning

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Remote sensing is improving day by day parallel to the development of sensors.This development increase research about Hyperspectral image classification.Classification is labeling data to the specified classes. When the classification is over, the success of the classification that is called accuracy is measured.Hyperspectral data contains many features.The high number of features decrease classification performance.Thus dimension reduction algorithms are applied to data.

In this paper, dimension reduction with using manifold learning techniques are represented.These manifold learning methods areLocally Linear Embedding(LLE), Isomap, Laplacian, Diffusion maps (DM), t-Distributed Stochastic Neighbor Embedding(t-SNE).

Airborne Visible/Infrared Imaging Spectrometer(AVIRIS) Indian Pine data and 'University of Pavia'data are used as datasets.

In order to measure classification performance Support Vector Machines(SVM), k Nearest Neighbor(kNN) and TreeBaggerclassifiers are used.

Datasets are embedded in 10, 20, 30, 40 dimensions respectively. Experiments show that applying dimension reduction to data, reduced classification time and improve classification performance. Before applying dimension reduction Indian Pine data's classification accuracy was %84.24 respect to SVM classifier. After applying dimension reduction methods For the Indian Pine data in 40 dimension DM algorithm gave %99.16 classification performance.

Keyword(s): Manifold learning,classification, dimension reduction

Matematik ve Fen Bilimleri Öğretmen Adaylarının Hazırladıkları Soruların Bloom Taksonomisi’ne Uygunluk Yönünden İncelenmesi

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Öğrenmeyi ölçme ve başarıyı belirlemede sorular önemli birer araçtır. Başarıyı etkili bir şekilde ölçmek için ise, öğretim sürecinde nitelikli ve amaca uygun sorular kullanmak gereklidir. Etkili sorular kullanmanın yolu da, bilişsel seviyenin bütün basamaklarının dikkate alınmasıyla gerçekleşmektedir. Taksonomi basamaklarına göre hazırlanan sorular, öğretmene eğitimde kolaylık sağlamanın yanında öğrencinin üst düzey becerilerini kuvvetlendirmekte aynı zamanda soruların yalnızca bir ya da iki basamakla sınırlanmasını önlemektedir. Ayrıca İlköğretim Kurumları Yönetmenliği genel esaslarında; öğrencinin başarısını belirlemek amacıyla hazırlanan ölçme araçlarında sadece bilginin ölçülmesinin değil, kavrama, kendini ifade edebilme, yorumlayabilme, uygulama, analiz, sentez ve değerlendirme düzeyinde edindikleri davranışların da ölçülmesinin gerekli olduğu belirtilmektedir. Bu doğrultuda, mevcut çalışma Matematik ve Fen Bilimleri öğretmen adaylarının Bloom taksonomisinin basamaklarına uygun, soru hazırlama yeterliliklerinin incelenmesini amaçlamaktadır.

Araştırma Ölçme ve Değerlendirme dersi kapsamında durum çalışması niteliğinde gerçekleştirilmiştir. Çalışmaya Muş Alparslan Üniversitesi İlköğretim Matematik ve Fen Bilimleri bölümü öğretmen adaylarından toplam 67 kişi katılmıştır. Uygulamada, öğretmen adaylarından 5., 6., 7. ve 8. sınıf matematik ve fen bilimleri müfredatı doğrultusunda konu sınırlandırması olmaksızın Bloom taksonomisinin her bir basamağına uygun soru yazmaları istenmiştir. Hazırlanan toplam 402 soru Bloom taksonomisine uygunluk yönünden alanında uzman kişiler tarafından incelenmiştir. Basamakların tanımları, anahtar sözcükleri ve bu basamaklara uygun farklı türde soru örnekleri, öğretmen adaylarının hazırladıkları soruların Bloom taksonomisine uygunlukları yönünden güvenilir bir biçimde çözümlenmesine yardımcı olmuştur. Öğretmen adaylarının her bir basamak için, doğru bir şekilde yazdıkları soruların frekansı alınarak analizler gerçekleşmiştir.

Çalışmadan elde edilen bulgular incelendiğinde; matematik öğretmen adaylarının %95’i bilgi, %73’ü kavrama, %54’ü uygulama, %24’ü analiz, %38’i sentez ve %35’i değerlendirme basamaklarında uygun sorular oluşturabilirken, fen bilgisi öğretmen adaylarının ise %90’ı bilgi, %87’si kavrama, %63’ü uygulama, %40’ı analiz, %67’si sentez ve %53’ü değerlendirme basamaklarında uygun şekilde sorular oluşturabilmişlerdir. Öğretmen adaylarının tamamına yakınının bilgi basamağında soru oluşturmada sorun yaşamadığı buna karşın büyük çoğunluğunun analiz basamağına uygun soru oluşturamadığı tespit edilmiştir. Branşlara göre bakıldığında ise, fen bilimleri öğretmen adaylarının genel olarak kategorilere uygun soru yazma oranının ilköğretim matematik öğretmen adaylarına göre daha fazla olduğu görülmüştür. Bu farklılığın ortaya çıkmasın da, matematik ve fen derslerinin yapısal olarak farklılık göstermesi ve fen konularının doğal yaşamla ilişkilendirilmesinin kolay olmasının temel etken olabileceği düşünülmektedir. İleriki çalışmalarda nedenleri belirlenerek öğretmen adaylarının konu ile ilgili eksikliklerinin giderilmesine yönelik çalışmalar yapılabilir.

Keywords: Bloom Taksonomisi, Öğretmen Adayı, Matematik, Fen

Öğretmen Adaylarının Kavram Yanılgıları İle İlgili Farkındalıklarının Alan Bilgileri Bağlamında Değerlendirilmesi

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Öğrencinin kavram hatasına düşmesi öğretimde sık rastlanan bir durum olmakla birlikte öğrencinin hatasının farkına varmaması ve öğretmenin bunu fark etmemesi tercih edilmeyen bir durum olarak karşımıza çıkmaktadır. Öğretmenler öğrencilerin hataya düşebilecekleri durumları tahmin etme ve gerekli önlemleri alma ile matematik öğretiminde anlamlı bir öğrenme gerçekleştirebilirler. Özellikle problem çözümlerinde öğrencilerin yanlış çözüm yapmalarına imkân vermeden problemi anlamlaştırma ve önemli noktaları vurgulama yoluna gidebilirler. Bu ise çoğu kez öğretmenin pedagojik alan bilgisi ile ilişkilendirilebilir.Dolayısı ile öğretmen öğrencilerin kavramsal hatalarını önlemek ve öğrencilerde daha anlamlı bir öğrenme sağlamak için bu hataların farkına varabilmeli ve pedagojik alan bilgileri kapsamında etkin öğretim yöntemlerini kullanabilmelidir. Bu çalışmanın amacı ilköğretim matematik öğretmeni adaylarının verilen bir problem karşısında öğrencilerde oluşabilecek kavram yanılgılarını tahmin edebilme ve etkin öğretim yöntemlerini kullanabilme bilgilerinin incelenmesidir.

Çalışmada nitel araştırma yöntemlerinden durum çalışması deseni kullanılmıştır.Araştırmanın çalışma grubunu ilköğretim matematik öğretmeni adaylarından 44 öğretmen adayı oluşturmaktadır. Verilerin toplanması, öğretmen adaylarının olası öğrenci hatalarını tahmin etme ve bu hatalara yönelik çözüm önerilerini ortaya koyma amacı güden kar-zarar konusuyla ilgili bir problemin öğretmen adaylarına yöneltilmesi ile gerçekleştirilmiştir.Öğretmen adaylarının bu probleme verdikleri cevaplarnitel analiz yöntemlerinden betimsel analiz tekniğiyle analiz edilmiştir. Analiz sonucunda öğretmen adaylarının çoğu verilen problem karşısında öğrencilerin düşebilecekleri kavram yanılgılarını tahmin edebilmesine karşın çok azı bu kavram yanılgılarını önlemeye yönelik etkin öğretim yöntemlerini kullanabilmiştir. Bu durum öğretmen adaylarının pedagojik alan bilgilerinin yeterince gelişmemesi ve onlardaki deneyim eksikliği ile ilişkilendirilebilir. Öğretmen adaylarına öğrencilerde oluşabilecek kavram yanılgılarını araştırma ve tahmin etmenin yanı sıra, bu hataları giderebilecekleri öğretim yöntemlerinin öğretildiği öğrenme ortamlarının sağlanması önerilmektedir.

Keywords: Kavramyanılgısı, Pedagoji, Alan bilgisi,Öğretmenadayı

On The Normal Stress Distribution in the Locally Curved Double-Walled Carbon Nanotube Embedded In Elastic Matrix Material

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The investigation is carried outvia the use of the three-dimensional geometrical linear exact equations of the theory of elasticityin the framework of the piecewise-homogeneous body model, themethoddevelopedforthe problem relatedtothedetermination of the normal stressdistribution in thelocallycurveddouble-walledcarbonnanotubes (DWCNT)embedded in elastic matrix material is considered. TheDWCNT is modeled as concentrically-nested two circular locally curved hollow cylinders between which there is free space. It is assumed that on the inner surface of the outer tube (cylinder) and on the outer surface of the inner tube (cylinder) of the DWCNT full slipping conditions satisfy. In addition to this, it is assumed that the difference between the radial displacements of the adjacent surfaces of the tubes resists with van der Waals forces.

It is assumed that thicknesses and radii of tubes of the DWCNT are constants along the tubes. Under this assumption, surface equations and the components of its normal are written. Expressions of the normal stresses are obtained from that. The boundary value problem is obtained by using strain-displacement relations, equilibrium equations with boundary conditions. Mentioned boundary value problem is solved by boundary form perturbation method and normal stresses are calculated. Effect of the various parameters on the normal stresses are investigated and interpreted.

Keyword(s): Doublewalled carbon nanotube, local curving, normalstress

Decay and Nonexistence of a Solution for a System of Higher-order Wave Equations

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In this work, we consider higher-order wave equations with damping and source terms. Firstly, we will prove decay of solutions. Later, we will prove the blow up of solutions in finite time. This improves earlier results in the literature.

Keyword(s): Decay, Nonexistence, Higher-orderWaveEquations

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Blowup of solutionsfor a system of nonlinear wave equations with degenerate damping terms

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In this study, we consider nonlinear wave equations with degenerate Damping and source terms. We shall prove the blow up of solutions in finite time with positive initial energy. This improves earlier results in the literature.

Keyword(s): Blow up, System of wave equation, Degenerate damping

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Determination of Mathematical Modeling Self-Efficacy of Pre-Service ElementaryMathematicsTeachers

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Mathematics curriculum emphasizes the preparation of environments for the development of problem-solving skills by modeling students. The development of mathematical modeling depends on teachers and in the process of bringing these skills to the students, teachers have important duties. In addition to the studies on mathematical modeling and modeling competencies, teachers' self-efficacy beliefs about their modeling competencies seem to be an important subject that might affect their effectiveness in the classroom. In this context, the purpose of this study was to determine the pre-service elementary mathematics teachers' self-efficacy levels on their mathematical modeling competencies, and examine this self-efficacy levels in terms of gender and grade.

In this study, descriptive survey method has been used. The research sample were composed of 206 pre-service teachers, being in the grades from between 1 - 4th, continuing their education in the Elementary Mathematics Teaching Program of a state university during the 2017- 2018 academic year. Data were collected using the "Self-efficacy scale for mathematical modeling competencies" developed by Koyuncu, Guzeller and Akyuz (2017). Statistical methods like mean, frequency and percentage had been used to define the pre-service elementary mathematics teachers' self-efficacy beliefs on their mathematical modeling competencies. Also, ANOVA and t-test were employed to analyze data.

Results of the study revealed that pre-service elementary mathematics teachers have medium level of self-efficacy of mathematical modeling competencies. The results of the analyses indicate that as students' grade levels increase, their self-efficacy of mathematical modeling competencies increase as well. Also, the results also showed that there is no significant difference between females and males with respect to their self-efficacy of mathematical modeling competencies.

Keyword(s): Mathematical modeling, self-efficacy, pre-service teachers

Reversible DNA Codes by Extending a Chain Ring

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Using DNA strings in computational problems started with the study of Adleman in 1994. He solved the Hamiltonian path problem, which is an NP-complete problem. Then, many researchers focus on associating DNA strings with mathematical structures. Especially, finding reversible DNA codes by using algebraic structures is an open problem for these studies. Reversible DNA codes have been studied over finite fields and various chain and non-chain ring structures. In this study, we extend a chain ring to a non-chain ring structure and obtain reversible DNA codes by using special sets.

Keyword(s): Reversible DNA codes, Non-chain rings

On the Perturbation of a Nonlinear Evolution Equation

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Nonlinear evolution equations (NLEE) are the mathematical models of problems that arise many field of science [1]. In recent years, evolution equations have become an important field of study in applied mathematics [2]-[3]. This work relates multiple scale method which is known as a perturbation method for nonlinear evolution equations (NLEE). By this way, integrable nonlinear Schrödinger (NLS) type equations has been derived from integrable high order Korteweg de Vries (KdV) type equation.

Keyword(s): Perturbation Method, Multiple Scales Method, Nonlinear Evolution Equation.
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Error Correcting Code Based One Dimensional Cellular Automata with IBC

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1D-CA based bit error correcting binary codes (CA-ECC) were first proposed by Chowdhury et al. in [1]. This method recently has been generalized to error correcting codes over non binary fields by Koroglu at al. in[2]. It is also known that CA based error correcting codes have some advantages compared to the classical ones[3]. In this section, we present an application of CA based bit error correcting codes by applying reversible CA which fall into a CA family within termediate boundary condition.

Keyword(s): Boundary Condition, Cellular Automata, Reversibility

References:

[1]D.R. Chowdhury, S. Basu, I.S. Gupta and P.P. Chaudhuri, Design of CAECC-Cellular Automata Based Error Correcting Code, IEEE Trans. Computers, 43 (1994) 759-764.

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Error Correcting Code Based Three Dimensional Cellular Automata with PBC

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1D-CA based bit error correcting binary codes (CA-ECC) were first proposed by Chowdhury et al. in [1]. Recently, Koroglu at al. in[2]. has generalized to error correcting codes over nonbinary fields. Error correcting codes have some advantages with CA Based[3]. We give an application of CA based bit error correcting codes by applying reversible CA which fall into a 3D-CA family with periodic boundary condition. We also compare the classical syndromede coding with the one introduced in this work.

Keyword(s): Boundary Condition, Cellular Automata, Reversibility

References:

[1]D.R. Chowdhury, S. Basu, I.S. Gupta and P.P. Chaudhuri, Design of CAECC-Cellular Automata Based Error Correcting Code, IEEE Trans. Computers, 43 (1994) 759-764.

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Categorical Aspects of the Textural Inverse Limits

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In this study, we discussed some various categorical aspects of the inverseor, projective systems and inverse limits described in the full subcategory **ifPDitop of ifDitop**, whose objects are ditopological plain textures paces and morphisms are bicontinuous point functions satisfying a compatibility condition between those spaces. In this context,the category $\mathbf{Inv_{ifPDitop}}$ consisting of the inverse systems established by the objects and morphisms of **ifPDitop**, besides the inverse systems of mappings, described between inverse systems is introduced. Following that some useful results are mainly obtained in a categorical – functorial setting by constructing the isomorphism functors between the related categories in the textural environment.

Keyword(s): Texture**,** Ditopology, Inverse Limit, Full Subcategory, IsomorphismFunctor

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Tauberian Theorems for Iterations of Weighted Mean Summable Integrals

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Let p be a positive weight function on $A:=[1,\infty)$ which is integrable in Lebesgue's sense over every finite interval $(1,x)$ for $1<x<\infty$, in symbol: $p\in L_{loc}^1(A)$ such that $P(x)=\int_1^{x}p(t)dt\neq 0$ for each $x>1$, $P(1)=0$ and $P(x)\to\infty$ as $x\to\infty$. For a real-valued function $f\in L_{loc}^1(A)$, we set $s(x):=\int_1^{x}f(t)dt$ and denote

$$\sigma_{p}^{(0)}(x):=s(x),\sigma_{p}^{(k)}(x):=(1/(P(x)))\int_1^{x}\sigma_{p}^{(k-1)}(t)p(t)dt \quad (x>1,k=1,2,...),$$

provided that $P(x)>0$. If

$$\lim_{x\to\infty}\sigma_{p}^{(k)}(x)=L,$$

we say that $\int_1^{\infty}f(x)dx$ is summable to L by the k-th iteration of weighted mean method determined by the function $p(x)$, or for short, (N,p,k) integrable to a finite number L and we write $s(x)\to L(N,p,k)$.

It is well-known that the existence of the limit $\lim_{x\to\infty}s(x)=L$ implies that of $\lim_{x\to\infty}\sigma_{p}^{(k)}(x)=L$. But the converse of this implication is not true in general.

In this work, we obtain some Tauberian theorems for the weighted mean method of integrals in order that the converse implication hold true. Our results extend and generalize some classical type Tauberian theorems given forCesàro and logarithmic summability methods of integrals.

Keyword(s): Tauberian theorems and conditions, Weighted mean method of integrals, Slowly decreasing sequences, Slowly oscillating sequences

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Control and simulation of experimental prototype for a 6 dof manipulator arm

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In this paper, we presented an experimental result for a 6 dof manipulator arm, this last, based on the inverse geometric model and the kinematic model. This paper develops the kinematic models a 6 DOF robotic arm and analyzes its workspace. The aim of this work, to develop a graphical user interface based on geometric model, using for LABVIEW environment and combine with arduino mega and our prototype, all that to control the placement of end effector position and also to follow a predefined trajectory.

Experimental results carried that using the developed cinematic model, for the end-effector can point to the desired coordinates within precision of ±0.2cm.

Keyword(s): 6 Dof manipulator arm, GUI,developed cinematic model, geometric model.

High Dimensional Quadrature Formula Using Sparse Grid Approximate Approximation Method

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In this presentation, a high dimensional quadrature formula via approximate approximation by using sparse grid with Gaussian kernel has been presented. We define multilevel version of this algorithm in order to overcome convergence problem. At the end the results of numerical examples for numerical integration for high dimensions have been presented.

Keyword(s): Gaussian, Quasi interpolation, Numerical integration, High dimension.

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Positive Solutions for Nonlinear Fractional Boundary Value Problems on an Infinite Interval

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This work is concerned with the existence of solutions for nonlinear boundary value problems of fractional differential equations. By using fixed point methods, we establish the existence of solutions on an infinite interval. Furthermore, an example is given to demonstrate our main result.

Keyword(s): Fractional boundary value problem, fixed point theorem, existence results

On the Solution of Initial Boundary Value Problem for Space-Fractional Diffusion Equation

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The aim of this study is to find the solution of initial boundary value problem for the one-dimensional space-fractional diffusion equation which has various applications. By using newly-defined inner product, the general solution of the boundary value problem is obtained. The space-fractional derivatives are taken in the sense of Caputo which is more suitable than Riemann-Liouville sense. By using the separation of variables method to reduce the problem to two ODEs, one of them is fractional ODE . The generalized solution is constructed in the form of a Fourier series with respect to the eigenfunctions of a certain eigenvalue problem.

Approximation of solutions of FPDE in two independent variables by fractional two-dimensional Taylor series

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Fractional two-dimensional Taylor series are studied. Then solutions of fractional partial differential equations (FPDE) in two independent variables are approximated by a partial sum of a fractional two-dimensional Taylor series. Illustrative numerical examples are given to demonstrate the validity and applicability of the present method.

Keyword(s): Caputo fractional derivative, fractional partial differential equation, distance in a metric space

Positive Solutions for Nonlinear Fractional Boundary Value Problems on an Infinite Interval

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This work is concerned with the existence of solutions for nonlinear boundary value problems of fractional differential equations. By using fixed point methods, we establish the existence of solutions on an infinite interval. Furthermore, an example is given to demonstrate our main result.

Keyword(s): Fractional boundary value problem, fixed point theorem, existence results

Analysis of Static Two-Dimensional Models for Multilayer Thermoelastic Piezoelectric Plates

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In this paper, we consider static three-dimensional model of plate with variable thickness, which may vanish on a part of the lateral boundary, consisting of several inhomogeneous anisotropic thermoelastic piezoelectric layers with regard to magnetic field [1]. On the basis of variational formulation we investigate the corresponding boundary value problem with mixed boundary conditions, when along certain parts of the lateral boundary mechanical displacement vector, temperature, electric and magnetic potentials vanish, while on the remaining parts of the boundary components of electric displacement, magnetic induction and heat flux vectors along the outward normal vector of the boundary are given, and on the interface surfaces between layers the rigid contact conditions are fulfilled, i.e. mechanical displacement and stress vectors, temperature, electric and magnetic potentials, and normal components of the heat flux, electric displacement and magnetic induction are continuous.

In order to construct two-dimensional models of the multilayer thermoelastic piezoelectric plate we use generalization and extension of dimensional reduction method suggested by I. Vekua[2] in the classical theory of elasticity for homogeneous isotropic plates with variable thickness. Applying variational approach we obtain a hierarchy of static two-dimensional models and investigate the existence and uniqueness of the corresponding boundary value problems in suitable weighted Sobolev spaces. Moreover, we prove that the sequence of vector-functions of three variables restored from the solutions of the two-dimensional problems converges to the solution of the original three-dimensional problem in the corresponding spaces and under additional conditions we obtain estimate of the rate of convergence.

Keyword(s): Thermo-electro-magneto-elasticity, Multilayer plates, Hierarchical two-dimensional models,
Acknowledgement: This work was supported by ShotaRustaveli National Science Foundation (SRNSF) [Grant number 217596, Construction and investigation of hierarchical models for thermoelastic piezoelectric structures].

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Compact Soft Elements andAlgebraic Soft Domains

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In the real world, most of times exact solution can not be found for the problems, so the real world problems can be solved approximately. Molodtsov introduced a new method that overcome uncertainties in the real world problem by approximating initial universe in 1999. Inrecentyears, thesoft set theory has beendevelopedincreasingly, such as softtopology, orderings on soft set wereintroduced.Forinstance, Babitha and Sunil gave definition of the soft set relation. By using soft set relations, directed soft set, way below soft set relation, auxiliary soft set relation were defined. In this study, byusingwaybelowsoft set relation, we define compact (isolated) soft element andalgebraic domain. Alsoweobtainsomeresults.

Keyword(s): Soft set, Soft set relation, Way-below soft set relation, Algebraic soft domain
Acknowledgement: This work is supported by the Scientific Research Project of MuğlaSıtkıKoçman University, SRPO (no: 16/073)and the Scientific Research Project of MuğlaSıtkıKoçman University, SRPO (no:18/062)

Relation Between Meet Continuous Soft Sets and Soft Scott Topology

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Soft Set theory was introduced by Molodtsov in 1999 to deal with uncertainties in the economics, engineering, environmental and related scientific areas which need of certain mathematical solutions but classical mathematical tools are inadequate to satisfy their needs related to the uncertainties derived from complicated problems. Moreover there are increasingly many studies about the soft set theory. Babitha and Sunil gave soft set relations. By using soft set relations, directed soft set, soft Scott topology and meet continuous soft set were defined. In this study, alternative definition for meet continuous soft set is given by using soft Scott topology. Also we showed that these two definitions are equivalent. Furthermore some results about meet continuous soft set and soft Scott topology are proved.

Keyword(s): Soft set, Soft set relation, Meet continuous soft set, Soft topology, Soft Scott topology
Acknowledgement: This work is supported by the Scientific Research Project of MuğlaSıtkıKoçman University, SRPO (no: 16/073) and the Scientific Research Project of MuğlaSıtkıKoçman University, SRPO (no:18/062)

Some Characterizations of Translation Surfaces in Lorentzian 3- Dimensional Heisenberg Group

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In this paper, some new characterizations of translation surfaces in Lorentzian 3-dimensional Heisenberg group are studied.

Keyword(s): Heisenberg group, Lorentz metric, translation surface.

Some New Characterizations of A-Net Parallel Surfaces in Riemannian Heisenberg Group

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In this paper, some new properties of A-net surfaces and parallel surfaces of A-net surfaces in Riemannian three dimensional Heisenberg group are obtained.

Keyword(s): Heisenberg group, parallel surface, A-net surface.

λ-Symmetriesand First Integrals of an Easter Island Population Model

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The purpose of this work is to investigate λ-symmetries and first integrals of Easter Island population model that was developed by Basener and Rose in [5]. λ-symmetry approach is very feasible to reduce ordinary differential equations and it acts a significant role to investigate their first integrals, integrating factors and analytical solutions. λ-symmetries of any second order ordinary differential equation can be derived by utilizing its Lie symmetries. Based on this relationship, some applications are presented for Easter Island population model in this study.

Keywords: λ-symmetries, Lie symmetries, Easter Island population, first integrals

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Quantitative estimates for bivariate Stancu operators

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In this paper, we introduce Voronovskaja-type and Grüss-Voronovskaja-type theorems in quantitative mean with the help of the usual modulus of continuity for bivariate Stancu operators which are different from tensor product setting.

Keyword(s): Bivariate Stancu operators, quantitative Voronovskaja-type theorem, quantitative Grüss-Voronovskaja-type theorem

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Summability Factor Relations Between Absolute Weighted And Cesàro Means

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By (X, Y) we denote the set of all sequences $\varepsilon = (\varepsilon_n)$ such that $\sum a_n \varepsilon_n$ is summable Y whenever $\sum a_n$ is summable X, where X and Y are two summability methods. In this study, we characterize the sets $(|C, -1|_k, |\overline{N}, p_n|)$ and $(|\overline{N}, p_n|, |C, -1|_k)$ for $k > 1$ and arbitrary positive sequences (p_n). Thus, some well known results are also extended.

Keyword(s): Summability Factors, Absolute Cesàro summability, Absolute weighted summability,

Lambert Series in the Summation of Reciprocals in Gaussian Fibonacci Sequences

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For any integer $n \geq 0$, the Gaussian Fibonacci numbers GF_n are defined by $GF_0 = i, GF_1 = 1$ and $GF_n = GF_{n-1} + GF_{n-2}$. The n^{th} Gaussian Fibonacci number is given by the equality $GF_n = F_n + iF_{n-1}$,where i is the imaginary unit which satisfies $i^2 = -1$.

Now, we call the definition of Lambert series$\sum_{n=1}^{\infty} a_n \frac{x^n}{1-x^n}$. We speak of the Lambert series and generalized Lambert series respectively,$L(x) = \sum_{n=1}^{\infty} \frac{x^n}{1-x^n} |x| < 1$,

$$L(a,x) = \sum_{n=1}^{\infty} \frac{a \cdot x^n}{1 - a \cdot x^n} |x| < 1, |ax| < 1.$$

In this study, we consider infinite sums$\sum_{n=1}^{\infty} \frac{1}{GF_n}$, $\sum_{n=1}^{\infty} \frac{1}{GF_{2n}}$, and $\sum_{n=1}^{\infty} \frac{1}{GF_{2n-1}}$derived from the reciprocals of the Gaussian Fibonacci numbers. New expressions of this sums are obtained in terms of Lambert series.

Keyword(s): Gaussian Fibonacci Number, Reciprocal Sum, Lambert Series.

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On Nonlinear Bivariate $m_1 m_2 -$ Singular Integral Operators

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In this study, we deal with nonlinear bivariate $m_1 m_2 -$ singular integral operators which are the generalizations of *m*-singular linear integral operators introduced by famous mathematician R. G. Mamedov in the year 1963 to nonlinear case. We start by giving some fundamental definitions. Then, we give a theorem concerning the conditions under which the indicated operators are well-defined in the space of Lebesgue integrable functions. Later on, we give pointwise and Fatou type approximation theorems. Finally, we establish the rates of convergences.

Keyword(s): bivariate $m_1 m_2 -$ singular integral operators, pointwise convergence, generalized Lebesgue point.

Fatou Type Convergence of Singular Integral Operators Equipped with Infinite Sum

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In the present study, we will prove the Fatou type pointwise convergence of the nonlinear convolution type singular integral operators involving summation in the following form:

$$\Psi_\lambda(f;x) = \sum_{m=1}^{\infty} \int_a^b f^m(t) H_{\lambda,m}(t-x)dt\,, \quad \lambda \in \Lambda,$$

where Λ is an index set consisting of non-negative real numbers with accumulation point λ_0 at a μ- generalized Lebesgue point of $f \in L_1 < a,b >$. Here, $< a,b >$ is an arbitrary bounded interval in real line. Also, f^m denotes m-th power of the function $f \in L_1 < a,b >$ (or $f \in L_1(\mathbb{R})$) and for $m \in \mathbb{N}$ a family $\{H_{\lambda,m}\}_{\lambda\in\Lambda}$ consisting of the globally integrable functions $H_{\lambda,m}(x,t): \mathbb{R}\times\mathbb{R} \to \mathbb{R}_0{}^{+}$ for each $\lambda \in \Lambda$.

Keyword(s): Singular integral operators, pointwise convergence, μ- generalized Lebesgue point

Characterization of Fuzzy Topology by Fuzzy Relations

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In this paper I have studied the concept of fuzzy topological space generated by a fuzzy relation as an extension of the corresponding concepts in [1], [2] and [3] respectively, for the crisp case. Then several related results have been shown. I have given some information about separation axioms in this fuzzy topology that some specific problems related to compactness can be found out in the future works.

Keywords: Fuzzy set, Fuzzy relation, Fuzzy topological space.

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A Survey on Being a Sober Space that Fulfills the Conditions of the Metric Space

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A common supercategory of topological spaces and metric spaces is defined as approach space by Lowen [1] in 1989. Sober approach space is introduced in [2] as the equivalent of sober topological space in metric texture. After that, sober metric approach space is defined in [3]. In the works of Smyth [4,5], smyth completeness introduced in 1994. The aim of this work is research to provide a relation between smyth complete metric space and sober metric approach space by findings in [3].

Keywords: Metric space, Sober, Approach space, Metric approach space, Sober approach space.

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An Algorithm for Solving High-Order Linear VIDEs

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In this paper, a numerical collocation method is developed for high-order linear Volterra integro-differential equations (VIDEs). An algorithm based on the use of Taylor polynomials is developed for the numerical solution of high-order linear VIDEs. It is shown that this algorithm is convergent. Numerical results are presented to prove the effectiveness of the presented algorithm..

Keyword(s): High-order linear Volterra integro-differential equations, Collocation method, Taylor polynomials.

Taylor Collocation Method for Solving High Order Delay Differential Equations with Variable Coefficients

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The main purpose of this work is to provide a new direct numerical method for high-order delay differential equations (DDEs). An algorithm based on the use of Taylor polynomials is developed for the numerical solution of high-order DDEs. It is shown that this algorithm is convergent. Numerical results are presented to prove the effectiveness of the presented algorithm. The main advantages of this collocation method are: This method is direct and the approximate solution is given by using explicit formulas, this method has a convergence order, moreover; there is no algebraic system needed to be solved, which makes the proposed algorithm very effective and easy to implement.

Keyword(s): High-order delay differential equations, Collocation method, Taylor polynomials.

A Note on Weighted $\alpha\beta$-Equistatistical Convergence of order γ

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The concept of weighted statistical convergence was introduced in [4]. The weighted statistical convergence is a non-trivial extension of statistical convergence since it reduces to statistical convergence for $s_k = 1$ for all $k \in \mathbb{N}$. Theweighted $\alpha\beta$-statistical convergence of order γ is considered in [3] which is not an extension of $\alpha\beta$-statistical convergence of order γ in the above sense. In this paper we introduced a different definition for weighted $\alpha\beta$-statistical convergence of order γ, which is a non-trivial extension of $\alpha\beta$-statistical convergence of order γ. Our definition has the advantagethat for $s_k = 1$ for all $k \in \mathbb{N}$, it reduces to$\alpha\beta$-statistical convergence of order γ. Also we use this advantage to introduced concepts of weighted lacunary statistical convergence of order γ,and weighted λ statistical convergence of order γ in a natural way.

Moreover we introducedweighted $\alpha\beta$-equistatistical convergence of order γ, weighted $\alpha\beta$-statistical uniform convergence of order γ and proved related Korovkin type approximation theorems.

Keyword(s): Statistical convergence, Weighted Statistical convergence, $\alpha\beta$-equistatistical convergence,

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On the Affine-Periodic Solutions of Discrete Dynamical Systems

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Affine periodicity is generalization of conventional periodicity notion and it is a symmetry property for classes of functions. This study concerns with the existence of (Q,T)-affine periodic solutions of discrete dynamical systems. Sufficient conditions for the main results are proposed due to discrete exponential dichotomy and fixed point theory. Obtained results are also implemented to some economic and biological models. In particular cases, our results cover some existing results in literature for periodic, anti-periodic or quasi-periodic solutions of difference equations.

Keywords: Affine periodic, exponential dichotomy, Schauder, fixed point

On the Structure of the Set Valued Maps

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The theory of the set valued maps is one of the new chapters of the contemporary mathematics. In general in classical definition of the functions it is required that the image of the given point is unique. But in the definition of the set valued maps this property is not necessary and it is accepted that the image of the given point is a subset of the appropriate space. For the first time the elements of the set valued analysis have been appeared in the problems studied in control theory, game theory, mathematical economics and etc. For example the mixed Nash equilibrium strategy in the finite nonzero sum game is a fixed point of the appropriate set valued map. Contemporary set valued analysis now studies both the generalizations of the problems of classical analysis and the problems which arise only in framework of the set valued analysis such as the existence of selectors, parametrization and representation of the set valued maps and so on. Note that one of the important applications of the set valued maps is the theory of differential inclusions. It is known that the set valued analogues of continuous linear operators are set valued maps the graph of which are conesorvector subspaces. These kinds of set valued maps are called processesor linear processes respectively. In this work the structure of the positive linear set valued maps defined on the coneare investigated. Note that the positive linear set valued map is a map which satisfy additivity and positive homogeneity conditions. There presentation of the positive linear set valued maps is established and Lipschitz continuity of these maps is proved. The estimations of upper and lower norms of the positive linear set valued maps are obtained.

Keywords: Set valued map, Representation, Continuity

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On the Metric and Coloring Properties of Generalized Fibonacci Graphs

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In this work, some metric and coloring properties of generalized Fibonacci graphs and their Cartesian product graphs of degree k are considered. Metric properties, including planarity, diameter, radius, center, distance center, Wiener index, etc. are studied. Moreover, chromatic number, chromatic index and the incidence chromatic numberof these graphsare calculated.

Keywords: Generalized Fibonacci graphs, Cartesian product of graphs, Graph Theory

A New Graph for Crossed Product of Groups

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Crossed product construction appears in different areas of algebra such as C^*-algebras, Lie algebras and group theory. This product has also many applications in other fields of mathematics like group representation theory and topology.
Here, by considering crossed product construction from view of Combinatorial Group Theory, we investigate the interplay between crossed product of groups and the graph-theoretic properties of this product in terms of its relations. Firstly, we define a new graph based on the crossed product of finite cyclic groups, and then discuss some graph properties on this new graph, namely diameter, maximum and minimum degrees, girth, degree sequence, domination number, chromatic number and clique number. Since graph theoretical studies (including such above graph parameters) consist of some fixed point techniques, they have been applied in fields such as chemistry and engineering, game theory and physics.

Keyword(s): Group Presentation, Graph Theory, Crossed Product

The weight functions and the dual bases of the Bernstein polynomials for n less than or equal to 4

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In this paper we will solve equations systems such that n = 1, ..., 4 to find the weight functions w such that the Bernstein polynomials are orthonormed with respect to the weighted scalar product.

On the other hand, for finding the dual bases of the Bernstein polynomials, we will sove another equations systems for n = 1,2.

Keywords —Bernstein polynomials, weight functions, equations systems.

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Parametric Generalization of Baskakov Kantorovich-type Operators

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In this study, we construct a non-negative real parametric generalization of the Baskakov Kantorovich-type operators. Firstly, we obtain the uniform convergence of new operators over unbounded intervals. Then, we establish a Voronovskaja-type theorem. In addition, we obtain the rate of convergence in terms of the weighted modulus of continuity.

Keyword(s): Baskakov operator**,** modulus of continuity, weighted approximation, Voronovskaja-type theorem

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Nonexistence of Solutions for a damped Klein-Gordon Equation with Arbitrary Positive Energy

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In this work, we are concerned with a Klein-Gordon equation with damping term, exponential sourceterm and high initial energy. By using a differential inequality and imposing some conditions on initial data we prove the nonexistence (blow up) of solutions in finite time.

Keyword(s): Blow up, Exponential source term, High initial energy.

The use of textbook in teaching practices: Case of mathematical proof teaching

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Our study falls within the general theoretical frameworkof the dual didactic and ergonomic approach developed by Aline Robert and Janine Rogalski (2002). It aims to identify the representations of Tunisian teachersabout the official mathematics textbook and their didactic choices relative to its use in the development of a lesson or during its concretization in class, particularly in the case of teaching mathematical proof.

In order to be able to bring replies to our questions, we adopted a methodology of research held in two times:

- In a first time, we have developped a global study focused on "speech on the practices" whose objective is to inform us on teacher representations and some of their choices relatively to the use of the textbook.

- In a second time, we have conducted a local study: it concerns the effective teaching practices based on the observation of a sequence presenting a mathematical proof.

Keyword(s): Teaching practices, Textbook, Mathematical proof.

Decay and blow up of solutions for hyperbolic type equations

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In this talk, we consider the decay, and blow up of solutions for a hyperbolic type equation. We proved the decay estimates of the energy function by using Nakao's inequality. Later, we proved the blow up of solutions for the hyperbolic equation with positive and negative initial energy.

Keyword(s): Decay, Blow up, Hyperbolic equation

Global Nonexistence of Solutions for a Extensible Beam Equation with Positive and Non-positive Initial Energy

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In this talk, we consider the Extensible beam equation associated with initial and Dirichlet boundary condition. We prove that the global non-existence of solutions with positive and non-positive initial energy.

Keyword(s): Global nonexistence, Beam equation, Initial energy

Pauli Oscillator in a Noncommutative Space

Mebarek Heddar , Mustafa Moumni, Mokhtar Falek

In this work we study the Pauli oscillator in a noncommutative space, we investigate the energy eigenvalues for a non-relativistic charged particle of spin half moving under the action of a constant magnetic field and a oscillator potential in a noncommutative space, where we have fond a critical value of a parameterof deformationθ and a critical value of magnetic field B, this values counteract the normal Zeeman effect and the unnormal Zeeman effect by the effect of the noncommutative space. The thermal properties of the system are also treated

Keyword(s): Noncommutative space,Pauli equation,Harmonic Oscillator.

Recent Developments on Approximation by Spline Functions

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For the first time in the history of the study of spline function, I have introduced few brand new types of spline functions and I have called them Integro Splines and Differentio Splines. In the traditional and conventional methods, to construct spline functions, we usually use the function values at the knots with some end-conditions in terms of known derivative values at the end points or the end-conditions in terms of derivatives and function values. In these new methods we assume that the function values are not available but we are given the first or second derivative values of the function at the knots or the integral values of the function on subintervals. By using the given derivative values at the knots, we will discuss on the construction of the Differentio Spline Functions and by using the given integral values we will introduce a series of Integro Spline Functions. Interestingly, in the recent years, we witness many different applications of these integro splines in different fields and different disciplines, such as numerical analysis, mathematical statistics, chaos and fractals, fuzzy data analysis, environmental science, mechanics, electricity, climatology, oceanography, signal processing, network traffic, control theory or robotics. In this short lecture, we do not have enough time for a long lecture with all details and this talk will be an introduction level lecture but definitely useful. For comparison, some numerical examples will be presented to illustrate the accuracy of these new spline functions together with the theorems on the order of convergence. A long list of references will be presented at the end of the lecture.

Keywords: Differentio Splines, Integro Splines, End conditions.

On Pointwise Approximation Properties of Certain Nonlinear Bernstein Operators

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The present work concerns with the nonlinear Bernstein type operators $NB_n f$, acting on bounded functions, where the kernel function of the operators satisfy some suitable assumptions. In particular, some pointwise convergence results for these type operators are obtained at a generalized Lebesgue point of the function f.

Keywords: Nonlinear Bernstein Operators, Pointwise Convergence, Generalized Lebesgue Point

An Eigenvalue Problem with Fuzzy Number Coefficient Boundary Condition

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In this paper is studied an eigenvalue problem with fuzzy number coefficient boundary condition. Fuzzy eigenvalues and fuzzy eigenfunctions of the worked problem are found.

Keywords: Fuzzy boundary value problem, Fuzzy eigenvalue, Fuzzy eigenfunction.

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Fuzzy Eigenvalue Problems

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In this paper is studied the solutions of fuzzy eigenvalue problems with constant number coefficients boundary conditions. Several examples are solved.

Keywords: Fuzzy boundary value problem, Sturm-Liouville theory, Eigenvalue.

An Induced Isometry on a Total Space of a Vector Bundle

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Let (E, π, M) be a vector bundle. There exists a specific Riemannian metric on E which is induced from a given Riemannian metric g on M. In this study, we use this special metric and define an isometry on the total space of the vector bundle E. We find these structures on the tangent bundle of S^1.

Keyword(s): Fiber bundles, Isometry Group, Vector Bundles,Principal Bundles.

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An Algorithm for Classifying Nilsoliton Metrics with Singular Gram Matrix

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In this work, we introduce an algorithmic approach in classifying nilpotent Lie algebras endowed with soliton metrics. This paper is a continuation of our paper in Journal of Symbolic Computation 50 (2013), 350 – 373. In our previous paper, we classified nilsoliton metric Lie algebras with nonsingular Gram matrix. In this paper, we consider same type of metric with singular Gram matrix. We give some detailed algorithms regarding to compute some desired properties of a Lie algebra.

Keyword(s): Nilsoliton Metrics, Nilpotent Lie algebras, Simple Derivation

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QRS Detection via machine learning algorithms

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In this study wavelet transform is used to remove thehigh and low frequency artefact on ECG. Afterwards, Support Vector Machine and Naive Bayes algorithms are applied separately. According to the study conductedon MIT-BIH arrhythmia database, SVM algorithm runs slower than Naive Bayes; however, results for SVM are much better for QRS detection.

Keyword(s): ECG, Machine Learning, Support Vector Machine, Naive Bayes, Wavelet Transform.

Wiener-Hopf Formulation of the Coaxial Wave guide with Mutual Impedance-Loaded Grooves

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The purpose of the present study is to investigate the influence of the mutual impedance-loaded grooves on the TEM wave radiation using the Wiener-Hopf technique. Direct Fourier transform is applied and the reflection and transmission coefficients are obtained in terms of infinite number of unknown coefficients. The effect of groove size and the surface impedances on radiation characteristics are discussed.

Keyword(s): Wiener-Hopf technique, Fourier transform

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Some Spectral Properties of Impulsive Schrödinger Operators

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In this talk, we are concerned with impulsive Schrödinger operator on the semi axis. Unlike the classical methods, we determine a transfer matrix to investigate the eigenvalues and spectral singularities. Then we present finiteness of eigenvalues and spectral singularities with finite multiplicities of the mentioned operator under some certain conditions.

Keyword(s): Impulsive operators, Scattering function, Spectral singularities,

Singular Multiparameter Differential Equations with Complex Potentials

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It is the purpose of this talk to make a study of the solutions of the finite system of following n differential equations

$$-y_r''(x_r) + q_r(x_r)y_r(x_r) = \left\{\sum_{k=!}^{n} \lambda_k w_{rk}(x_r)\right\} y_r(x_r), \quad x_r \in [a_r, b_r),$$

where$[a_r, b_r), r = 1,2, \dots, n,$ denotes$n$ semi open intervals in which a_r is the regular b_r is the singular point, also q_r is a complex valued function such that $q_r = q_{r1} + iq_{r2}$ and w_{rk} is a real valued function on$[a_r, b_r)$.

The main idea of the study is to extend the Weyl-Titchmarsh limit point, limit circle theory to the multiparameter case. At first, we construct Weyl theory for the single singular multiparameter differential equation. Then using the obtained results for the single equation with several parameters, we investigate the number of the products of the squarely integrable solutions of the singular several equations with complex coefficients and several parameters.

Keyword(s): Multiparameter eigenvalue problem, Weyl theory, Tensor product,

Mathematical and numerical study for a model of Nickel-Iron alloy electrodeposition on rotating disk electrode

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To better understand the nickel-iron electrodeposition process, we are interested in the one-dimensional model. This model addresses dissociation, diffusion, electomigration, convection and deposition of multiple ion species. We study the global existence of solutions that are here different ion concentrations in the mixture as well as the electric potential. The classic techniques, based on the C^{α} estimations, to prove the existence and the positivity of solutions fall in defect and news techniques must be developed. We present them here and we obtain global existence and positivity of classical solution for our model in the quadratic case, without any restriction of growth on the non linear terms.

Keyword(s): Poisson--Nernst--Planck equations, electrochemical systems, Bulter-Volmer reaction kinetics.

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Some results for a class of quasilinear parabolic systemswith data measures and arbitrary growth nonlinearities

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The goal of this paper is to study existence or nonexistence of global weak solutions for some quasilinear parabolic systems with initial data measuresand critical growth nonlinearity with respect to the gradient. Various necessary conditions are obtained on the data for existence.

Keyword(s): Quasilinear parabolic system, Global weak solution, Initial data measures.

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Formulation of Realistic Motion Model for a Humanoid Robot

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A mathematical model for the motion of a humanoid robot head model is derived to simulate the realistic human motion. This model concerns with turning the head and eyes of the humanoid robot head from any initial sight orientation towards a certain final sight orientation. As eyes move much faster than head, then the objective function of this model is to minimize the eyes angle difference from their zero position. This model is basically derived as inverse kinematics problem solution for head and eyes of the humanoid robot and motion of eyes and head is smoothed with higher order polynomials to achieve smooth and realistic motion.

Keyword(s): Humanoid Robot, Motion, Inverse Kinematics
Acknowledgement: EngTechs Ltd. - Turkey for supporting this project.

A Uniform Convergent Numerical Method for a Volterra Delay-Integro-Differential Equation with Initial Layer

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This study is concerned with the finite-difference solution of singularly perturbed initial value problem for a linear first order Volterra integro-differential equation with delay. These equations appear in many scientific applications [1, 4]. The construction of the method is based on the method of integral identities with the use of appropriate interpolating quadrature rules with the weight and remainder terms in integral form [2, 3]. Uniform convergence of the numerical method on a special nonuniform mesh is established. Numerical results are also presented.

Keyword(s): Delay-integro-differential, Delay difference scheme, Uniform convergence, Singular perturbation.

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Numerical Methods for Solving Singularly Perturbed Ordinary Differential Equations

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In this work, a brief survey on computational techniques for the different classes of singularly perturbed ordinary differential equations is given. This work including the papers of author and contains the literature of the work done by the researchers after the year 2000. This survey work follows many of the main strands in the developments of numerical methods of singularly perturbed problems and can serve as an introduction to some of the ideas and methods for the singular perturbation problems.

Key Words: Singular perturbation, Boundary layers, Layer adapted meshes, Uniform convergence

Ergodic Theorem in Weighted Variable Exponent Lebesgue and Amalgam Spaces

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Firstly, we give some basic information about weighted variable exponent Lebesgue and amalgam spaces. Secondly, we discuss an ergodic theorem in these spaces.

Keyword(s): Weighted Variable Exponent Lebesgue and Amalgam Spaces, Ergodic Theorem, Probability Measure

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On Some Continuous Embeddings of a Banach Space

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Our purpose is to define an intersection space of weighted Lebesgue and variable exponent Sobolev spaces. We will consider the basic properties of this space. Also, we investigate the boundedness of Hardy-Littlewood maximal operator on this space and reveal some results. Moreover, we give some continuous embeddings under the some conditions.

Keyword(s): Weighted variable exponent Sobolev spaces, continuous embeddings, Hardy-Littlewood maximal operator.

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A new gamma type operators with the help $(p;q)$- calculus

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In this study, we present a new Gamma-type operators with the help of $(p;q)$-calculus. We study on the operators in a weighted space of real valued functions and obtain the rate of these convergence via weighted modulus of continuity. Furthermore, Voronovskaja type theorem is given.

Keyword(s): $(p;q)$ - Gamma operators, $(p;q)$ - calculus, Voronovskaja type theorem, weighted approximation.

Mathematical model for compressible viscous micropolar fluid flow

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With the classical Navier-Stokes equations physical phenomena of fluid flow were only considered at the macro level. However, the rapid development of science, which among other areas, is focused on nanotechnology requires an analysis of phenomena at the micro level as well. The first considerations that go in the direction of studying micro phenomena appear in the works of brothers Cosserat created at the beginning of the last century. But because of its complexity this theory remained neglected for many years until in the 1960s A. C. Eringen introduced the concept of the micropolar fluid.

Eringen's theory assumes that each particle of fluid has a finite size and contains a microstructure. The general Eringen's approach introduces the microdeformation tensor, which he calls director.In this way, we obtain the model which is too complicated for practical use and Eringen proposed a simpler model where microdeformations are not allowed. Therefore, the behavior of the fluid at the microlevel is described by using one new vector field - microrotation velocity.

Here we analyze the compressible flow of an isotropic, viscous and heat conducting micropolar fluid, which is in the thermodynamical sense perfect and polytropic. The boundaries of the spatial domain present solid thermally insulated walls, initial density as well as initial temperature are strictly positive, and corresponding problem has homogeneous boundary conditions.

We present the models with different dimensions of spatial domain whereby weanalyze the existence and uniqueness of the solution, as well as the asymptotic behavior of the solution.

Keyword(s): compressible micropolar fluid, generalized solution, homogeneous boundary conditions

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A research on sigmoid numbers and polynomials related toEuler polynomials

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We define sigmoid numbers and polynomials that are related to Euler polynomials of the first kind. From these polynomials we investigate important properties, identities, and roots. In addition, we find some relationship between sigmoid polynomials and Bernoulli polynomials.

Keyword(s): sigmoid numbers and polynomials, Euler polynomials, Bernoulli polynomials
Acknowledgement: This research was supported by Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Science, ICT and Future Planning(No. 2017R1E1A1A03070483).

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A tensor decompositions Algorithm for 3D fluorescence spectroscopy imaging

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In this work, we will focus on methodological developments around non-negative tensor decompositions for 3D fluorescence spectroscopy imaging. Modern day imaging is mainly challenged by so-called inverse problems, when the amount of data isvery large, this inverse problem may become ill-posed and consequently hard to solve. A way to address this problem, is to use criteria optimization algorithms consisting in measuring the modeling error(fidelityterm), to which isoptionally added a regularization term.

The effectiveness and the robustness of the proposed process are shown on numerical examples.

Keyword(s): Constrained optimization, Nonnegative tensor decomposition, imaging.

HMM with emission process resulting from a special Combination of Independent Markovian Emissions

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One of the most used variant of Hidden Markov Models (HMMs) is the standard case where the time is discrete and the state spaces (hidden and observed spaces) are finite. In this HMMs framework, we interest to HMMs whose emission process results from a combination of independent Markov chains. Principally, we assume that the emission process evolves as follows: given a hidden state realization k at time t, an emission is a realization of a Markov chain Y^k_t at time t and for two different hidden states k and k', Y^k_t and $Y^{k'}_t$ are assumed independent. Given hidden process, the considered emission process selects its achievements from independent and homogeneous Markov chains evolving simultaneously.

Keyword(s): Hidden Markov Model, Markov chain, emission state, statistical estimation.

Darboux Helices in Euclidean 4-spaces

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In this talk, we study Darboux helix in Euclidean 4-space. We show that the notions of Darboux helix and general helix are equivalent in this space. In a special case, if the first and third curvatures of the curve are equal then the notions of darboux helix, general helix and V_4-Slant helix are equivalent.

Keyword(s): Darboux vector, General helix, Slant Helix.

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Variance reduction in Monte Carlo simulation of M/G/1 retrial queuing system

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In Monte Carlo simulation, Random Sampling (RS) method is well known and intensively used to represent the stochastic behavior of random variables but it is an inaccurate sampling procedure. Several sampling methods representing better than RS the random behavior of stochastic input variables can be found in the literature. Amongst them, a special attention is given to Refined Descriptive Sampling (RDS)[1] since it was selected as one of the best sampling method. This paper deals with Monte Carlo simulation of stationary M/G/1 retrial queues and focuses on the accuracy of its performances[2]. We used RS and RDS to generate input samples. We designed and realized a software under Linux system using the C compiler, which provides performance measures of M/G/1 retrial queues. It computes their variance reduction in order to compare both sampling methods. We show therefore, that the simulated retrial M/G/1 queues for a given time period and for different service time distributions, that proper use of RDS through its getRDS generator reduces the variance of the estimates of all considered output random variables parameters. The RDS simulation results are then, more accurate than RS and can significantly improve performances sometimes by a substantial variance reduction factor.

Keywords

Variance reduction; Sampling; Monte Carlo Methods; Simulation; Retrial Queues

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201-233.

On Optimal Stochastique Control with Jump Diffusion " Risk-sensitive"

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Throughout this paper we focused our aim on the problem of optimal control under a risk-sensitive performance functional where the system is given by a fully coupled Forward-Backward Stochastic differential equation with jump. The risk neutral control system is established as extition of the existing results in such problem has been studied as preliminary step, where the admissible controls are convex and optimal solution exists, the sufficient optimality conditions for risk-sensitive performance are proved. At the end of this work we illustrate our main result by giving an example of risk sensitive control problem under linear stochastic dynamics with exponential quadratic cost function.

Key words: Fully Coupled Forward Backward Stochastic Differential Equation with Jump, Risk-sensitive, Necessary Optimality Conditions, Sufficient Optimality Conditions, Optimal control, Logarithmic Transformation.

BSDE driven by Jump Markov Process with continuous coefficient

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In this paper, we deal with backward stochastic differential equations (BSDEs) driven by a jump Markov process and an independent Brownian motion. We first show the existence and uniqueness of solutions under a Lipschitz condition on the coefficient further we give a comparaison Theorem. Then we study the existence of a (minimal) solution for BSDE where the coefficient is continuous and satisfy the linear growth condition.

Keyword(s): Backward stochastic differential equations, jump Markov process, comparaison Theorem.,

Wavelets on Graphs via Deep Learning andImages Approximation

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An increasing number of applications require processing of signals defined on weighted graphs. While wavelets provide a flexible tool for signal processing in the classical setting of regular domains. This work introduces a machine learning framework for constructing graph wavelets thatcan sparsely represent a given class of signals. The construction uses the lifting scheme, based on the observation that the recurrent nature of the lifting scheme gives rise to a structure resembling adeep auto-encoder network. We use an unsupervised training, which is conducted similarly to thepre-training of a stack of auto-encoders. After the training step, we obtain a linear wavelet transformthat can be applied to any graph signal. Finally, we illustrate the capability of this transform to represent digital images viewed as graphsignals.

Keyword(s): Wavelets, The lifting Scheme, DeepLearning,Image.

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Existence of solutions for differential inclusions with two-point and integral boundary conditions

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The aim of this paper is to investigate the existence of solutions for a First-order multivalued differential equation with two-point and integral boundary condition in a Banach space of the following form

$$\begin{cases} x'(t) \in F\big(t, x(t)\big) & a; e\ t \in [0, T] \\ \alpha x(0) + \beta x(T) = \int_0^T g\big(s, x(s)\big) ds \end{cases} \qquad (1)$$

Where $F: [0, T] \times \mathbb{R} \to P(\mathbb{R})$ is multivalued function, $g: [0, T] \times \mathbb{R} \to \mathbb{R}$ is given function and $\alpha, \beta \in \mathbb{R}$.

The existence results are obtained by using well known fixed point theorems.

Keywords: Differential inclusions, two-point and integral boundary conditions, fixed point theorem.

On a semi-Markovian random walk processes with delaying screen described by means of a fractional order differential equation

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We study a process of the semi-Markovian walk with a delaying screen given in general form by means of integral equation. In this paper, the residence time of the system is given by the gamma distribution with the parameters α and β resulting in a fractional order integral equation. The purpose of this paper is to reduce the fractional order integral equation to a fractional order differential equation and its solution.

It is very well known that the semi-Markovian random walk processes is generalized Markov processes. The urgent requirements of practice in the 1950s led to the search for an adequate mathematical description. In most processes, the length of the system stay in a given state is not distributed exponentially. Therefore, the functioning of such a system will not be described by the Markov process. For such processes, the Markov property will not be satisfied, although the process retains some important properties concerning the Markov property. Semi-Markov processes appeared as such models. The most important information concerning semi-Markov processes was studied by B. P. Harlamov in [2].

Let there be given a sequence of independent and identically distributed pairs of random variables $\{\xi_k, \eta_k\}_{k\geq 0}$ defined on any probability space (Ω, F, P) such that $\xi_k \geq 0$. By given random variables we construct the process of a semi-Markovian random walk as

$$X_1(t) = \sum_{i=0}^{k} \eta_i, \text{if } \sum_{i=1}^{k} \xi_i \leq t < \sum_{i=1}^{k+1} \xi_i$$

where $\xi_0 = 0,\ \eta_0 = Z.$ By [1] we delay considered process in zero as

$$X(t) = X_1(t) - \inf_{0\leq s\leq t}(0, X_1(s)).$$

The process $X(t)$ is called the semi-Markovian random walk process. (see, also [3])

We note that the considered process is described by a fractional order differential equation

$$D_z^{\alpha+1}Q(\theta,\gamma \mid z) - (\lambda+\beta)D_z^{\alpha}Q(\theta,\gamma \mid z) + \lambda\beta^{\alpha}\varphi(\theta)Q(\theta,\gamma \mid z) = (\lambda+\gamma)\frac{1-\varphi(\theta)}{\theta}D_z^{\alpha}e^{(\beta-\gamma)z},$$

(1)

where $0<\alpha<1$ and $D_z^{\alpha}Q$ is the Riemann-Liouville fractional derivative of order α. (see,[4]).

We introduced the following theorem.

Theorem 1. Let $s > \gamma - \beta$ The solution of fractional order differential equation (3.8) has a form

$$Q(\theta,\gamma \mid z) = \frac{(1-\varphi(\theta))(\gamma+\lambda)}{\theta}\sum_{n=0}^{\infty}\sum_{k=0}^{\infty}(-\lambda\beta^{\alpha}\varphi(\theta))^{n}(\lambda+\mu)^{k}C_{n+k}^{k}z^{k+n(\alpha+1)+1}E_{1,k+n(\alpha+1)+1}((\beta-\gamma)z)+$$

$$+Q(\theta,\gamma \mid 0)\sum_{n=0}^{\infty}\sum_{k=0}^{\infty}\frac{(-\lambda\beta^{\alpha}\varphi(\theta))^{n}(\lambda+\mu)^{k}C_{n+k}^{k}}{\Gamma(k+n(\alpha+1)+1)}z^{k+n(\alpha+1)+1}$$

where $E_{1,k+n(\alpha+1)+1}((\beta-\gamma)z)$ is Mittag-Leffer function.

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A Change of Base for Braided Crossed Modules of Groups

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Brown and Gilbert introduced the notion of braided crossed modules as algebraic models for homotopy 3-types. The notion of induced crossed modules is highly related with the notion of fibred category introduced by Grothendieck. A forgetful functor from crossed modüle to groupsis both a fibration and cofibration. That is for a map of groupoids, pullback and induced crossed module of groupoids can be constructed with the given map. In this work we investigate the necessary conditions for the forget ful functor from the category of braided crossed modules to that of groups which implies a change of base for braided crossed modules.

Keyword(s): Braided Crossed Module, Category Theory, Crossed Module

Finite Limit Calculationsin2-Crossed R-Modules of Algebras

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Crossed modules were initially defined by Whitehead as an algebraic model for homotopy connected 2-types. The use of limits of objects in any category has very important results and there are many applications in most are as such as computer science. In this work, we Show that the category of 2-crossed R-modules has a finite limits of objects by constructing the product of two quadratic modules and the notion of equaliser of given two morphisms in the category of quadratic R-modules.

Keyword(s):2-Crossed Module, CategoryTheory, Pullback

On the Solutions of Linear Fractional Differential Equations of Order 2q , Including Small Delay where 0<q<1

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The main goal of this study is to find the solutions of linear fractional differential equations of order 2q , including small delay, where 0<q<1 which has various applications. The fractional derivatives are taken in the sense of Caputo which is more suitable than Riemann-Liouville sense. We assume that the order q satisfy the condition n.q=1 for some natural number n which determines the number of the linearly independent solutions. Since the delay term is small, the linear fractional differential equation is expanded in powers series of ε which reduce the problem to regular perturbation problem for which it is easier to find the solution. Finally this method is illustrated by some examples.

A Study on Pointwise Convergence of the Special Class of the Nonlinear Double Integral Operators

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In 1983, Julian Musielak* introduced a new type approximation problem using the nonlinear integral operators in the form of $T_\omega f(t) = \int_a^b K_\omega\big(s-t, f(s)\big)\,ds, t \in \langle a, b\rangle, \omega \in \mathrm{I}$. In his study the notation of the linearity of the operators was replaced by a Lipschitz condition on K_ω with respect to second variable. We have created our study inspired by the Musielak's article. We shall give the one theorem on the point wise convergence problems for nonlinear integral operators. This problem is given at a generalized Lebesgue point of integrable functions on an arbitrary rectangular region in $\mathbb{R}^2$.

*Musielak, J., On some approximation problems in modular spaces, In: *Constructive Function Theory, Proceedings of International Conference Varna, 1-5 June, 1981*, Publication House of Bulgarian Academic of Sciences, Sofia, pp. 181-189, 1983.

Keyword(s): nonlinear integral operators, Lebesgue point, singular integrals, Lipschitz condition,

A Study on Pointwise Convergence by the Non-Convolution Type Nonlinear Integral Operators at the Lebesgue Points

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In 1983, Julian Musielak* introduced a new type approximation problem using the nonlinear integral operators in the form of $T_\omega f(t) = \int_a^b K_\omega\big(s-t, f(s)\big)\,ds, t \in \langle a, b\rangle, \omega \in \mathrm{I}$. In his study the notation of the linearity of the operators was replaced by a Lipschitz condition on K_ω with respect to second variable.We have created our study inspired by the Musielak's article. We shall give the one theorem on the point wise convergence problems by using the non-convolution type nonlinear integral operators. This problem is given at a generalized Lebesgue point of integrable functions on an arbitrary rectangular region in $\mathbb{R}^2$

*Musielak, J., On some approximation problems in modular spaces, In: *Constructive Function Theory, Proceedings of International Conference Varna, 1-5 June, 1981*, Publication House of Bulgarian Academic of Sciences, Sofia, pp. 181-189, 1983.

Keyword(s): nonlinear integral operators, Lebesgue point, singular integrals, Lipschitz condition,

On some aspects of interacting Gibbsian lattice Systems

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Since the time of Gibbs, the field of interacting Systems has been given a lot of attention in mathematics and physics worlds.The past 50 years have seen much progress in our understanding of the behaviour of complex interactive Gibbsian lattice systems . Interactive Gibbsian lattice systems is a branch of Probability theory with close connections to Mathematical Physics, Mathematical Biology and finance. This work provides an introduction to some stochastic systems of lattice. We are given a Cartesian lattice with periodic boundary conditions and we considerdiscrete variables that represent magnetic dipole moments of atomic *spins* that can be in one of two states (+1 or −1). The spins are arranged in a graph, usually a lattice, allowing each spin to interact with its neighbors. We design a local chain that adds or removes individual tiles in each step, where the transition probabilities are defined so that the chain converges to the Gibbs distribution.We study the equilibrium and some results of phase transition on the lattice.

Keyword(s): Ising model, Gibbsian systems,interacting lattice

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On Some Dynamics and Forecasting Behavior of the Mean Reverting Stochastic Volatility Process with Correlation

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Volatility and its measurement are thus of great importance in financial markets and in derivatives pricing in particular. It is know that the assumptation of constant volatility in Black-Scholes model is incompatible with some empirical study in the real markets. In an attempt to remedy the drawback of the constant volatility, many models have been proposed to incorporate stochastic volatility. In this work, we introduce the mean reverting stochastic volatility model and we study some dynamics proprieties of this model for the risk neutral environment.We will derive some analytical closed formulae for the expectation of the realized variance for stochastic volatility by Heston stochastic process with correlation and we present a numerical example for forecasting.

Keyword(s): mean reverting volatility, financial markets, stochastic process

Analysis of the Capability of a Machine Tool- Approach by Artificial Intelligence

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Obtaining a good surface quality during a finishing operation of a material depends mainly on the performance of the machine tool and an optimal adjustment of the cutting conditions (choice of tool, cutting parameters ...). This study focuses on the application of artificial intelligence approach to analyze the performance of a manufacturing machine. It aims firstly, to expertise the machining system capabilities, and secondly, the establishment of real information for adjusting machine tool (acquisition of graphs). In this case, a specific program based on artificial intelligence has been developed to establish the optimal conditions for rational use of the machine tool.

Keyword(s): Neuron Networks, Surface finish,Optimization, Prediction, Manufacturing

Using refined descriptive sampling in integration

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Refined Descriptive sampling (RDS) is a sampling method that can be used to produce input values for estimation of expectations of functions of output variables [3]. The simple random sampling (SRS) is the traditional technique for selecting such inputs variables. This approach is used to estimate integrals over multidimensional domains [1] [2].

In this paper we compare the RDS method with the SRS method in integration problems. We prove that the variance of RDS estimator is lower than that of SRS estimator in Monte Carlo simulation.

Keywords:
Simulation, Monte Carlo Methods, Sampling Theory, Estimation, Variance Reduction

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Average order of an additive function linked With generalized divisors of an integer

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An arithmetic function f is any real or complex-valued function defined on the Set of Positive Integers $\mathbb{N}^*$. It is said to be additive if it satisfies $f(nm) = f(n) + f(m)$, whenever $(n, m) = 1$.

In this talk, we give the average order of the additive function

$$f(n) = \sum_{p^\alpha \| n} \sum_{m=1}^{\alpha} \frac{1}{m} ,$$

where p is a prime number, $\alpha \in \mathbb{N}^*$, $n = \prod_{p^\alpha \| n} p^\alpha$ and $p^\alpha \parallel n$ means that p^α divides n, but $p^{\alpha+1}$ does not.

Keyword(s): Averageorder, Arithmeticfunctions, Asymtotic formula.

An Effective Metaheurictic Algorithm in Order to Solve the Traveling Salesman Problem

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The traveling salesman problem (TSP) is one of the most well-known combinatorial optimization problem and holds a central place in logistics management. This problem has received much attention because of its practical applications in industrial problems and many exact, heuristic and metaheuristic approaches have been proposed to solve TSP. Recently, many researchers have found that the employment of hybridization in optimization problems can improve the quality of obtained solutions in comparison with heuristic and meta-heuristic approaches. Since hybrid algorithms have greater ability to find an optimal solution, they have been considered by researchers and scientists in recent years.Besides, since the TSP is an NP-hard combinatorial optimization problem, metaheuristic methods have proved to be more suitable for dealing with such problem in terms of solution quality and computational cost. So,a modified ant colony optimization is presented in this paper.The proposed algorithm uses only a global updating, which will increase pheromone on the edges of the best routes. Furthermore, a candidate list and some local search algorithms are combined for obtaining high-quality solutions. It can be concluded that making use of some proposed modifications leads the algorithm avoids risky edges and moves toward more appropriate edges and finds better solutions as a result.The proposed metaheuristic algorithm is tested on the well-known TSP instances involving 14 benchmark problems from 48 to 200 nodes. The computational results show that our algorithm is better than other meta-heuristic algorithms in terms of solution quality. Furthermore, the gap of the proposed algorithm stays on average almost 1% of the execution time and also the most best known solutions of the benchmark problems are foundby the proposed algorithm.

Keyword(s): Traveling Salesman Problem, Ant Colony Optimization, NP-hard Problems.

A Novel Finding of Hidden Bifurcation in The Multiscroll Chen Attractors in 3 Dimentional

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The aim of our work is to study the hidden biffurcation in dynamical systems. The first appear of this method was by genuine Leonov and kuznetsov who proposed an analytical-numerical method. We interess to apply his method in system 3-dimentional parameters in the situation of multidirectional multiscroll chen attractors. We study the multiscroll chen attractors generated via Saturated Function series and check some numerically results method obtained for value of parameter ε and t.

Keywords : Hidden bifurcation, Multiscroll attractors, Chen’s system.

Green's function of the Dirichlet problem for the differential operator on a star-shaped graph

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1. Introduction

Let us proceed to the problem formulation. Consider a star-shaped graph G with edges $e_j,\ j=\overline{1,m},$ of equal length π. For each edge e_j introduce the parameter $x_j \in [0,\pi]$. The value $x_j = 0$ corresponds to the boundary vertex associated with e_j, and $x_j = \pi$ corresponds to the internal vertex.

The set $W_2^2(G)$ consists functions $y=[y_j]_{j=1}^m$, its components from $y_j \in W_2^2[0,\pi]$. Let H the set of functions y from $W_2^2[0,\pi]$ satisfying the standard matching conditions in the internal vertex

$$\begin{cases} y_1(\pi) = y_j(\pi), \quad j=2,\dots,m \\ \sum_{j=1}^{m} y_j'(\pi) = 0 \end{cases} \tag{1}$$

In electrical networks, they express the law of Kirchhoff (see [1]), with the vibrations of elastic networks - the balance of voltage, etc. We also give the Dirichlet boundary conditions in the boundary vertices

$$y_j(0) = 0,\ j=1,\dots,m \tag{2}$$

On the set of function H we consider the differential equation

$$-y_j''(x_j) + q_j(x_j)y_j(x_j) = \lambda y_j(x_j) + f_j(x_j) \tag{3}$$

where $y=[y_j]_{j=1}^m$ is a vector function on the graph G, λ is the spectral parameter, the so-called potentials $q_j(x_j)$, $j=\overline{1,m},$ are complex-valued functions from $L_2(0,\pi)$, $f_j(x_j)-$ the density distribution of an external force on the edge e_j.

2. The Green's function of the Dirichlet problem

We give some intervening results.

In this subsection we study the question of the existence of the Green's function of the Dirichlet problem

$$-u''(x)+q(x)u(x)=\lambda u(x)+P(x),\ 0<x<\pi \tag{4}$$

$$u(0)=0,\ u(\pi)=0 \tag{5}$$

By the Green's function we mean a function of twovariables $G(x,s,\lambda)$, which is definedwhen $x\in[0,\pi], s\in[0,\pi]$ and such that for eachcontinuous $P(\cdot)$ on the segment $[0,\pi]$. The solution of the initial boundary value problem (4)-(5) can be represented in the form

$$u(x,\lambda)=\int_0^\pi G(x,s,\lambda)P(s)ds.$$

Lemma 1. The solution of the Dirichlet problem (4) - (5) can be represented in the form

$$u(x,\lambda)=\int_0^x \frac{S_0(t,\lambda)S_\pi(x,\lambda)}{D(t,\lambda)}P(t)dt+\int_x^\pi \frac{S_\pi(t,\lambda)S_0(x,\lambda)}{D(t,\lambda)}P(t)dt \quad , \tag{6}$$

where $D(t,\lambda)=-S'_\pi(t,\lambda)S_0(t,\lambda)+S_\pi(t,\lambda)S'_0(t,\lambda)$ and the functions $S_0(x,\lambda)$ and $S_\pi(x,\lambda)$ are linearly independent solutions of the homogeneous Cauchy problem

$$-S_0''(x)+q(x)S_0(x)=\lambda S_0(x),\ 0<x<\pi,\ S_0(0,\lambda)=0,\ S_0'(0,\lambda)=1$$

$$-S_\pi''(x)+q(x)S_\pi(x)=\lambda S_\pi(x),\ 0<x<\pi,\ S_\pi(\pi,\lambda)=0,\ S_\pi'(\pi,\lambda)=1$$

Proof. We show that the right-hand side $P(x)$ of (6) is a solution of problem (5).

We first calculate the first derivative

$$u'(x,\lambda)=\int_0^x \frac{S_0(t,\lambda)S_\pi'(x,\lambda)}{D(t,\lambda)}P(t)\,dt+\int_x^\pi \frac{S_\pi(t,\lambda)S_0'(x,\lambda)}{D(t,\lambda)}P(t)\,dt+\frac{S_0(\mathrm{x},\lambda)S_\pi(x,\lambda)}{D(\mathrm{x},\lambda)}P(x)-$$
$$-\frac{S_0(\mathrm{x},\lambda)S_\pi(\mathrm{x},\lambda)}{D(\mathrm{x},\lambda)}P(x)$$

hence

$$u'(\mathrm{x},\lambda)=\int_0^x \frac{S_0(t,\lambda)S_\pi'(\mathrm{x},\lambda)}{D(t,\lambda)}P(t)\,dt+\int_x^\pi \frac{S_\pi(t,\lambda)S_0'(\mathrm{x},\lambda)}{D(t,\lambda)}P(t)\,dt$$

Then we calculate the second derivative

$$u''(\mathrm{x},\lambda)=\int_0^x \frac{S_0(t,\lambda)S_\pi''(\mathrm{x},\lambda)}{D(t,\lambda)}P(t)\,dt+\int_x^\pi \frac{S_\pi(t,\lambda)S_0''(\mathrm{x},\lambda)}{D(t,\lambda)}P(t)\,dt+\frac{S_0(\mathrm{x},\lambda)S_\pi'(\mathrm{x},\lambda)}{D(\mathrm{x},\lambda)}P(x)-\frac{S_\pi(\mathrm{x},\lambda)S_0'(\mathrm{x},\lambda)}{D(\mathrm{x},\lambda)}P(x)$$

or

$$u''(\mathrm{x},\lambda)=\int_0^x \frac{S_0(t,\lambda)S_\pi''(\mathrm{x},\lambda)}{D(t,\lambda)}P(t)\,dt+\int_x^\pi \frac{S_\pi(t,\lambda)S_0''(\mathrm{x},\lambda)}{D(t,\lambda)}P(t)\,dt-P(x)$$

Since $S_0''(x,\lambda)=(q(x)-\lambda)S_0(x,\lambda),\ S_\pi''(x,\lambda)=(q(x)-\lambda)S_\pi(x,\lambda)$, then

$$u''(\mathrm{x},\lambda)=(q(x)-\lambda)\left(\int_0^x \frac{S_0(t,\lambda)S_\pi(\mathrm{x},\lambda)}{D(t,\lambda)}P(t)\,dt+\int_x^\pi \frac{S_\pi(t,\lambda)S_0(\mathrm{x},\lambda)}{D(t,\lambda)}P(t)\,dt\right)-P(x)=\left|\overset{from}{(6)}\right|=(q(x)-\lambda)u(\mathrm{x},\lambda)-P(x)$$

this implies the relation (4).

Now let us verify the fulfillment of boundary conditions (5).

We substitute $x=0$ into (6), then obtain

$$u(0,\lambda)=\int_0^\pi \frac{S_\pi(t,\lambda)S_0(0,\lambda)}{D(t,\lambda)}P(t)\,dt=\left|S_0(0,\overset{as}{\lambda})=0\right|=0$$

Substituting $x=\pi$ into (6), then

$$u(\pi,\lambda)=\int_0^\pi \frac{S_0(t,\lambda)S_\pi(\pi,\lambda)}{D(t,\lambda)}P(t)\,dt=\left|S_\pi(\pi,\overset{as}{\lambda})=0\right|=0$$

The lemma 1 is proved.

From Lemma 1 the next theorem follows.

Theorem 1. The Green's function of the Dirichlet problem (4) - (5) has the form

$$G_g(x,t,\lambda)=\begin{cases}\dfrac{S_0(t,\lambda)S_\pi(\mathrm{x},\lambda)}{D(t,\lambda)} & when\ 0<t<x\\ \dfrac{S_\pi(t,\lambda)S_0(\mathrm{x},\lambda)}{D(t,\lambda)} & when\, x<t<\pi\end{cases}$$

where $D(t,\lambda)=-S'_\pi(t,\lambda)S_0(t,\lambda)+S_\pi(t,\lambda)S_0^{'}(t,\lambda)$, $S_0(x,\lambda)$ and $S_\pi(x,\lambda)$ from the lemma 1.

In conclusion, of this subsection, we want to notice, that

$$D(\mathrm{t},\lambda)=\begin{vmatrix}S_\pi(\mathrm{t},\lambda) & S_0(\mathrm{t},\lambda)\\ S_\pi^{'}(\mathrm{t},\lambda) & S_0^{'}(\mathrm{t},\lambda)\end{vmatrix}$$

Consequently, the next relation is true $\frac{d}{dt}D(\mathrm{t})=0.$ Because of it, we can write

$$D(\mathrm{t},\lambda)=D(0,\lambda)=\begin{vmatrix}S_\pi(0,\lambda) & S_0(0,\lambda)\\ S_\pi^{'}(0,\lambda) & S_0^{'}(0,\lambda)\end{vmatrix}=S_\pi(0,\lambda)=-S_0(\pi,\lambda).$$

3. The Green's function of problem (1) - (2) - (3)

In this section, we calculate the solution $y_1(x_1),y_2(x_2),...,y_m(x_m),0<x_j<\pi,\ j=1,...,m$ of problem (1) - (2) - (3) by the right-hand sides $f_1(x_1), f_2(x_2),..., f_m(x_m)$ of equation (3).

First we consider the particular case when $f_2(x_2)=...=f_m(x_m)=0$. That is, by the set of functions $f_1(x_1), f_2(x_2)\equiv 0,..., f_m(x_m)\equiv 0$ must be found $y_1(x_1), y_2(x_2),..., y_m(x_m)$.

Let be e_j - the edge of the graph G . We introduce on the edges e_j the functions $S_{0j}(x_j,\lambda); S_{\pi j}(x_j,\lambda)$ that are solutions of the homogeneous Cauchy problem:

$$-y_j^{"}(x_j)+q_j(x_j)y_j(x_j)=\lambda y_j(x_j),$$

$$S_{0j}(0)=0,\ S_{0j}^{'}(0)=1,$$

$$S_{\pi j}(\pi)=0,\ S'_{\pi j}(\pi)=1$$

We introduce the solution of problem (1) - (2) - (3) in the form:

$$\begin{cases} y_2\left(x_2,\lambda\right)=B_1S_{01}\left(\pi,\lambda\right)S_{02}\left(\mathrm{x}_2,\lambda\right)...S_{0m}\left(\pi,\lambda\right) \\ ...\ ...\ ... \\ y_m\left(x_m,\lambda\right)=B_1S_{01}\left(\pi,\lambda\right)S_{02}\left(\pi,\lambda\right)...S_{0m}\left(\mathrm{x}_m,\lambda\right) \\ y_1\left(x_1,\lambda\right)=B_1S_{01}\left(\mathrm{x}_1,\lambda\right)S_{02}\left(\pi,\lambda\right)...S_{0m}\left(\pi,\lambda\right)+\int\limits_0^{\mathrm{x}_1}\dfrac{S_{01}\left(t,\lambda\right)S_{\pi1}\left(\mathrm{x}_1,\lambda\right)}{D_1\left(t,\lambda\right)}f_1\left(t\right)dt+ \\ +\int\limits_{\mathrm{x}_1}^{\pi}\dfrac{S_{\pi1}\left(t,\lambda\right)S_{01}\left(\mathrm{x}_1,\lambda\right)}{D_1\left(t,\lambda\right)}f_1\left(t\right)dt \end{cases} \qquad (7)$$

where $D_1\left(t,\lambda\right)=S'_{01}\left(t,\lambda\right)S_{\pi1}\left(t,\lambda\right)-S'_{\pi1}\left(t,\lambda\right)S_{01}\left(t,\lambda\right)$

We show that the functions given by system (7) satisfy equations (3), boundary conditions (2), and the relations:

$$y_1\left(\pi\right)=y_j\left(\pi\right),\ \ j=2,...,m \qquad (8)$$

First, let us verify the fulfillment of boundary conditions (2).

Substituting the value $x_1=0,\ x_2=0,\ ...\ ,\ x_m=0$ into (7), we obtain

$$\begin{cases} y_2\left(0,\lambda\right)=B_1S_{01}\left(\pi,\lambda\right)S_{02}\left(0,\lambda\right)...S_{0m}\left(\pi,\lambda\right)=\left|S_{02}\overset{\text{так как}}{\left(0,\lambda\right)}=0\right|=0 \\ ...\ ...\ ... \\ y_m\left(0,\lambda\right)=B_1S_{01}\left(\pi,\lambda\right)S_{02}\left(\pi,\lambda\right)...S_{0m}\left(0,\lambda\right)=\left|S_{0m}\overset{\text{так как}}{\left(0,\lambda\right)}=0\right|=0 \\ y_1\left(0,\lambda\right)=B_1S_{01}\left(0,\lambda\right)S_{02}\left(\pi,\lambda\right)...S_{0m}\left(\pi,\lambda\right)+\int\limits_0^{\pi}\dfrac{S_{\pi1}\left(t,\lambda\right)S_{01}\left(0,\lambda\right)}{D_1\left(t,\lambda\right)}f_1\left(t\right)dt=\left|S_{01}\overset{\text{так как}}{\left(0,\lambda\right)}=0\right|=0 \end{cases}$$

Let's check conditions (8).

Substituting the value $x_1=\pi,\ x_2=\pi,\ ...\ ,\ x_m=\pi$ into (7), then

$$\begin{cases} y_2(\pi,\lambda)=B_1S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}(\pi,\lambda) \\ \ldots\ \ldots\ \ldots \\ y_m(\pi,\lambda)=B_1S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}(\pi,\lambda) \\ y_1(\pi,\lambda)=B_1S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}(\pi,\lambda)+\int_0^{\pi}\frac{S_{01}(t,\lambda)S_{\pi 1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt=\left|\overset{\text{так как}}{S_{\pi 1}(\pi,\lambda)=0}\right|= \\ =B_1S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}(\pi,\lambda) \end{cases} \tag{9}$$

This implies the relation (8).

Now let us verify the fulfillment of equations (3).

We first calculate the first derivative of the relation (7).

$$\begin{cases} y_2'(x_2,\lambda)=B_1S_{01}(\pi,\lambda)S_{02}'(\mathrm{x}_2,\lambda)\ldots S_{0m}(\pi,\lambda) \\ \ldots\ \ldots\ \ldots \\ y_m'(x_m,\lambda)=B_1S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}'(\mathrm{x}_m,\lambda) \\ y_1'(x_1,\lambda)=B_1S_{01}'(\mathrm{x}_1,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}(\pi,\lambda)+\int_0^{\mathrm{x}_1}\frac{S_{01}(t,\lambda)S_{\pi 1}'(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)\,d+\int_{\mathrm{x}_1}^{\pi}\frac{S_{\pi 1}(t,\lambda)S_{01}'(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt \end{cases}$$

Then we calculate the second derivative of the relation (7).

$$\begin{cases} y_2''(x_2,\lambda)=B_1S_{01}(\pi,\lambda)S_{02}''(\mathrm{x}_2,\lambda)\ldots S_{0m}(\pi,\lambda) \\ \ldots\ \ldots\ \ldots \\ y_m''(x_m,\lambda)=B_1S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}''(\mathrm{x}_m,\lambda) \\ y_1''(x_1,\lambda)=B_1S_{01}''(\mathrm{x}_1,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}(\pi,\lambda)+\int_0^{\mathrm{x}_1}\frac{S_{01}(t,\lambda)S_{\pi 1}''(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt+ \\ +\int_{\mathrm{x}_1}^{\pi}\frac{S_{\pi 1}(t,\lambda)S_{01}''(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt+\frac{S_{01}(\mathrm{x}_1,\lambda)S_{\pi 1}'(\mathrm{x}_1,\lambda)}{D_1(\mathrm{x}_1,\lambda)}f_1(\mathrm{x}_1)-\frac{S_{\pi 1}(\mathrm{x}_1,\lambda)S_{01}'(\mathrm{x}_1,\lambda)}{D_1(\mathrm{x}_1,\lambda)}f_1(\mathrm{x}_1)= \\ B_1S_{01}''(\mathrm{x}_1,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}(\pi,\lambda)+\int_0^{\mathrm{x}_1}\frac{S_{01}(t,\lambda)S_{\pi 1}''(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt+\int_{\mathrm{x}_1}^{\pi}\frac{S_{\pi 1}(t,\lambda)S_{01}''(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt-f_1(x_1) \end{cases}$$

Since $S_{0j}''(x_j,\lambda)=\left(q_j(x_j)-\lambda\right)S_{0j}(x_j,\lambda),\ S_{\pi j}''(x_j,\lambda)=\left(q_j(x_j)-\lambda\right)S_{\pi j}(x_j,\lambda),\ j=1,\ldots,m$

then

$$\begin{cases} y_2''(x_2,\lambda)=(q_2(x_2)-\lambda)B_1S_{01}(\pi,\lambda)S_{02}(x_2,\lambda)...S_{0m}(\pi,\lambda)=(q_2(x_2)-\lambda)y_2(x_2,\lambda) \\ ...\ ...\ ... \\ y_m''(x_m,\lambda)=(q_m(x_m)-\lambda)B_1S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)...S_{0m}(\mathrm{x}_m,\lambda)=(q_m(x_m)-\lambda)y_m(x_m,\lambda) \\ y_1''(x_1,\lambda)=(q_1(x_1)-\lambda)B_1S_{01}(\mathrm{x}_1,\lambda)S_{02}(\pi,\lambda)...S_{0m}(\pi,\lambda)+ \\ +(q_1(x_1)-\lambda)\left[\int_0^{\mathrm{x}_1}\frac{S_{01}(t,\lambda)S_{\pi1}(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)dt+\int_{\mathrm{x}_1}^{\pi}\frac{S_{\pi1}(t,\lambda)S_{01}(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)dt\right]-f_1(\mathrm{x}_1)= \\ =(q_1(x_1)-\lambda)y_1(x_1,\lambda)-f_1(\mathrm{x}_1) \end{cases}$$

This implies the relation (3).

Theorem 2.When $\mathrm{f}_2(\mathrm{x}_2)\equiv 0,...,\mathrm{f}_\mathrm{m}(\mathrm{x}_\mathrm{m})\equiv 0$ the solution of the Dirichlet problem (1) - (2) - (3) can be written in the form

$$\begin{cases} y_1(x_1,\lambda)=-\frac{S_{01}(\mathrm{x}_1,\lambda)S_{02}(\pi,\lambda)...S_{0m}(\pi,\lambda)}{\Delta(\lambda)}\int_0^{\pi}\frac{S_{01}(t,\lambda)S_{\pi1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)dt+\int_0^{\mathrm{x}_1}\frac{S_{01}(t,\lambda)S_{\pi1}(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)dt+\int_{x_1}^{\pi}\frac{S_{\pi_1}(\mathrm{t},\lambda)\mathrm{S}_{01}(x_1,\lambda)}{D_1(t,\lambda)}f \\ y_2(x_2,\lambda)=-\frac{S_{01}(\pi,\lambda)S_{02}(\mathrm{x}_2,\lambda)...S_{0m}(\pi,\lambda)}{\Delta(\lambda)}\int_0^{\pi}\frac{S_{01}(t,\lambda)S_{\pi1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)dt \\ ...\ ...\ ... \\ y_m(x_m,\lambda)=-\frac{S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)...S_{0m}(\mathrm{x}_m,\lambda)}{\Delta(\lambda)}\int_0^{\pi}\frac{S_{01}(t,\lambda)S_{\pi1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)dt \end{cases}$$

where $\Delta(\lambda)=\sum_{j=1}^{m}S_{01}(\pi,\lambda)...S_{0\,j-1}(\pi,\lambda)S'_{0\,j}(\pi,\lambda)\mathrm{S}_{0\,j+1}(\pi,\lambda)...S_{0m}(\pi,\lambda)$

Proof. According to the relations (7), the second equality from (1) gets the form

$$B_1\sum_{j=1}^{m}S_{01}(\pi,\lambda)...S_{0\,j-1}(\pi,\lambda)S'_{0\,j}(\pi,\lambda)...S_{0m}(\pi,\lambda)=-\int_0^{\pi}\frac{S_{01}(t,\lambda)S'_{\pi1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)dt \tag{10}$$

Consider a truncated system

$$\begin{cases} y_2(x_2,\lambda)=B_1S_{01}(\pi,\lambda)S_{02}(\mathrm{x}_2,\lambda)...S_{0m}(\pi,\lambda) \\ -\int_0^{\pi}\frac{S_{01}(t,\lambda)S'_{\pi1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)dt=B_1\sum_{j=1}^{m}S_{01}(\pi,\lambda)...S_{0\,j-1}(\pi,\lambda)S'_{0\,j}(\pi,\lambda)...S_{0m}(\pi,\lambda) \end{cases} \tag{11}$$

This implies

$$y_2(x_2,\lambda)=-\frac{S_{01}(\pi,\lambda)S_{02}(\mathrm{x}_2,\lambda)...S_{0m}(\pi,\lambda)}{\Delta(\lambda)}\int_0^{\pi}\frac{S_{01}(t,\lambda)S'_{\pi 1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt$$

Similarly, from equations (10) and (7) we obtain

$$y_m(x_m,\lambda)=-\frac{S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)S_{03}(\pi,\lambda)...S_{0m}(\mathrm{x}_m,\lambda)}{\Delta(\lambda)}\int_0^{\pi}\frac{S_{01}(t,\lambda)S'_{\pi 1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt$$

Consider a truncated system

$$\begin{cases} y_1(x_1,\lambda)=B_1S_{01}(\mathrm{x}_1,\lambda)S_{02}(\pi,\lambda)...S_{0m}(\pi,\lambda)+\int_0^{\mathrm{x}_1}\frac{S_{01}(t,\lambda)S_{\pi 1}(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt+ \\ +\int_{\mathrm{x}_1}^{\pi}\frac{S_{\pi 1}(t,\lambda)S_{01}(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt \\ B_1\Delta(\lambda)=-\int_0^{\pi}\frac{S_{01}(t,\lambda)S'_{\pi_1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt \end{cases}$$

(12)

We write the system of solutions in the form

$$\begin{cases} y_1(x_1,\lambda)=-\frac{S_{01}(\mathrm{x}_1,\lambda)S_{02}(\pi,\lambda)...S_{0m}(\pi,\lambda)}{\Delta(\lambda)}\int_0^{\pi}\frac{S_{01}(t,\lambda)S'_{\pi 1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt+ \\ +\int_0^{\mathrm{x}_1}\frac{S_{01}(t,\lambda)S_{\pi 1}(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt+\int_{\mathrm{x}_1}^{\pi}\frac{S_{\pi 1}(t,\lambda)S_{01}(\mathrm{x}_1,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt \\ y_2(x_2,\lambda)=-\frac{S_{01}(\pi,\lambda)S_{02}(\mathrm{x}_2,\lambda)...S_{0m}(\pi,\lambda)}{\Delta(\lambda)}\int_0^{\pi}\frac{S_{01}(t,\lambda)S'_{\pi 1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt \\ ...\ ...\ ... \\ y_m(x_m,\lambda)=-\frac{S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)...S_{0m}(\mathrm{x}_m,\lambda)}{\Delta(\lambda)}\int_0^{\pi}\frac{S_{01}(t,\lambda)S'_{\pi 1}(\pi,\lambda)}{D_1(t,\lambda)}f_1(t)\,dt \end{cases}$$

(13)

It follows that for $f_2\equiv f_3\equiv ...f_k\equiv 0$ and arbitrary $f_1(\cdot)$ the solution of the problem (1) - (2) - (3) is given by the formula (13).

Theorem 3.Let $f_1(x_1),...,f_m(x_m)$ be arbitrary, the Green's function of the Dirichlet problem (1) - (2) - (3) can be written in the form

$$G_{g_j}\left(x_j,t,\lambda\right)=-\frac{1}{\Delta(\lambda)}\begin{bmatrix} S_{01}\left(x_1,\lambda\right)S_{02}\left(\pi,\lambda\right)...S_{0m}\left(\pi,\lambda\right)\\ S_{01}\left(\pi,\lambda\right)S_{02}\left(x_2,\lambda\right)...S_{0m}\left(\pi,\lambda\right)\\ ...\\ S_{01}\left(\pi,\lambda\right)S_{02}\left(\pi,\lambda\right)...S_{0m}\left(x_m,\lambda\right)\end{bmatrix}\cdot\left[\frac{S_{01}(t,\lambda)S'_{\pi_1}(\pi,\lambda)}{D_1(t,\lambda)},...,\frac{S_{0m}(t,\lambda)S'_{\pi_m}(\pi,\lambda)}{D_m(t,\lambda)}\right]+$$

$$+diag\{G_{g_1}(x_1,t,\lambda),G_{g_2}(x_2,t,\lambda),...,G_{g_m}(x_m,t,\lambda)\}$$

where

$$G_{g_j}\left(x_j,t,\lambda\right)=\begin{cases}\dfrac{S_{0j}\left(t,\lambda\right)S_{\pi j}\left(x_j,\lambda\right)}{D_j\left(t,\lambda\right)} & when\ 0<t<\pi\\ \dfrac{S_{\pi j}\left(t,\lambda\right)S_{0j}\left(x_j,\lambda\right)}{D_j\left(t,\lambda\right)} & when\ x_j<t<\pi,\ j=1,...,m.\end{cases}$$

Proof.

The relations (13) can be rewritten by the form of matrix-vector

$$\vec{Y}_1\left(\vec{X}\right)=\begin{bmatrix} y_1\left(x_1,\lambda\right)\\ y_2\left(x_2,\lambda\right)\\ ...\\ y_m\left(x_m,\lambda\right)\end{bmatrix}=-\frac{1}{\Delta(\lambda)}\begin{bmatrix} S_{01}\left(x_1,\lambda\right)S_{02}\left(\pi,\lambda\right)...S_{0m}\left(\pi,\lambda\right)\\ S_{01}\left(\pi,\lambda\right)S_{02}\left(x_2,\lambda\right)...S_{0m}\left(\pi,\lambda\right)\\ ...\\ S_{01}\left(\pi,\lambda\right)S_{02}\left(\pi,\lambda\right)...S_{0m}\left(x_m,\lambda\right)\end{bmatrix}\frac{S_{01}(t,\lambda)S'_{\pi_1}(\pi,\lambda)}{D_1(t,\lambda)}+\begin{bmatrix} G_{g_1}\left(x_1,t,\lambda\right)\\ 0\\ ...\\ 0\end{bmatrix}$$

if $f_2(x_2)\equiv...f_m(x_m)\equiv 0.$

Similarly the solution $\vec{Y}_2(\vec{X})$ of the problem (1)-(2)-(3) when $f_1(x_1)\equiv 0, f_3(x_3)\equiv 0,...,f_m(x_m)\equiv 0$ can be calculated .The same reasoning give the solutions $\vec{Y}_3(X_3),...,\vec{Y}_m(X_m)$. For arbitrary $f_1(x_1),...,f_m(x_m)$ the solutions of the problem (1)-(2)-(3) has the form

$$\vec{Y}(X)=\vec{Y}_1(X)+\vec{Y}_2(X)+...+\vec{Y}_m(X)=-\frac{1}{\Delta(\lambda)}\begin{bmatrix} S_{01}\left(x_1,\lambda\right)S_{02}\left(\pi,\lambda\right)...S_{0m}\left(\pi,\lambda\right)\\ S_{01}\left(\pi,\lambda\right)S_{02}\left(x_2,\lambda\right)...S_{0m}\left(\pi,\lambda\right)\\ ...\\ S_{01}\left(\pi,\lambda\right)S_{02}\left(\pi,\lambda\right)...S_{0m}\left(x_m,\lambda\right)\end{bmatrix}.$$

$$\cdot\left[\frac{S_{01}(\mathrm{t},\lambda)\mathrm{S}'_{\pi_1}(\pi,\lambda)}{D_1(\mathrm{t},\mathrm{x})}+\frac{S_{02}(\mathrm{t},\lambda)\mathrm{S}'_{\pi_2}(\pi,\lambda)}{D_2(\mathrm{t},\lambda)}+\ldots+\frac{S_{0m}(\mathrm{t},\lambda)\mathrm{S}'_{\pi_m}(\pi,\lambda)}{D_m(\mathrm{t},\lambda)}\right]dt+$$

$$+diag\{\mathrm{G}_{g_1}(\mathrm{x}_1,\mathrm{t},\lambda),\mathrm{G}_{g_2}(\mathrm{x}_2,\mathrm{t},\lambda),\ldots,\mathrm{G}_{g_m}(\mathrm{x}_m,\mathrm{t},\lambda)\}=$$

$$-\frac{1}{\Delta(\lambda)}\begin{bmatrix} S_{01}(x_1,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}(\pi,\lambda)\\ S_{01}(\pi,\lambda)S_{02}(\mathrm{x}_2,\lambda)\ldots S_{0m}(\pi,\lambda)\\ \ldots \\ S_{01}(\pi,\lambda)S_{02}(\pi,\lambda)\ldots S_{0m}(\mathrm{x}_m,\lambda)\end{bmatrix}\cdot\left[\frac{S_{01}(\mathrm{t},\lambda)\mathrm{S}'_{\pi_1}(\pi,\lambda)}{D_1(\mathrm{t},\lambda)},\ldots,\frac{S_{0m}(\mathrm{t},\lambda)\mathrm{S}'_{\pi_m}(\pi,\lambda)}{D_m(\mathrm{t},\lambda)}\right]+$$

$$+diag\{\mathrm{G}_{g_1}(\mathrm{x}_1,\mathrm{t},\lambda),\mathrm{G}_{g_2}(\mathrm{x}_2,\mathrm{t},\lambda),\ldots,\mathrm{G}_{g_m}(\mathrm{x}_m,\mathrm{t},\lambda)\}$$

Abstract: Differential operators on graphs often arise in mathematics and different fields of science such as mechanics, physics, organic chemistry, nanotechnology, etc. [2]. In this paper we deduced the Green function of the Dirichlet problem for a differential operator on a star-shaped graph. We study the differential operator with standard matching conditions in the internal vertices and the Dirichlet boundary conditions at boundary vertices.
Keywords: graph, Green's function, Dirichlet problem

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An Analysis of Mathematical Errors Made by Year 4 Students on Fraction Related Word Problems

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Previous studies hadindicated that a vast majority of students could show satisfactory performance in solving arithmetical computational exercises but failed when it came to the mathematical word problems (Clement & Ellerton, 1992). Interestingly, educators and researchers in mathematics education argued that fractions related word problems are one of the majorassessmentin mathematics where most students even in the years of primary education encounter difficulties that eventually yield errors. This project, therefore, aims to figure outand analyse some mistakes made by year four students in one of primary school in England when attempting word problem situationsinvolving fractions. A qualitative methodology approach is used to carry out this study,and the types of errors made are figured out through diagnostic mathematicstest and interview which involving eight primary students. Those eightfourth-graders consist of native English speakersand also students with English as a secondary language (ESL).By using Newman Error Analysis (NES) on written mathematical tasks, this project has indicated that the students interviewed have failed to arrive at the correct answer due to various causes that are reading errors, comprehension errors, transformation errors, process skills errors and encoding errors. All these errors are hierarchical phases, that is to say, failureat any stage of this hierarchy will prevent the student to carry on to the next phases.Another salient type of errors indicated in this study is carelessness error in which a student who got an incorrect answer in written test got correct answer with outstanding reasoning after he is interviewed. With these various types of errors made by students, it is, therefore, emerging in the sense of the importance of providing appropriate remedial for each student. In other words, this study provides an essential recommendation to teachers in terms of giving remedial for students that one who failed due to reading error should get remedial that could overcome this from developing further.

Keyword(s): Error Analysis, Fraction related Word Problems, Primary Student

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A Novel Finding of Hidden Bifurcation in the Multiscroll Chen Attractors in 3 Dimentional

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The aim of our work is to study the hidden biffurcation in dynamical systems. The first appear of this method was by genuine Leonov and kuznetsov who proposed an analytical-numerical method. We interess to apply his method in system 3-dimentional parameters in the situation of multidirectional multiscroll chen attractors. We study the multiscroll chen attractors generated via Saturated Function series and check some numerically results method obtained for value of parameter ε and t.

Keywords : Hidden bifurcation, Multiscroll attractors, Chen's system.

Commutativity Conditions of Some Time-varying Systems

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Consider the cascade connection of two subsystems; if the input-output relation of the cascaded system does not changed when the order of connections of subsystems is changed we say that two subsystems are commutative and they constitute a commutative pair. The subsystems may be analog (continuous-time) or digital (discrete-time) systems. The commutativity concept is introduced and the conditions under which two subsystems form a commutative pair are presented. The scope is confined to analog systems of which input-output relation is described by differential equations. Both the cases of zero and non-zero initial conditions are dealt with. Further, benefits of commutativity are indicated with some applications.

Keyword(s): Commutativity, Commutative Pairs, Time-varying Systems

On the Variance of Systematic Sampling: A Simulation

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The variance estimation of systematic sampling is an important problem for the researches in an application field of the design-based stereology. The systematic sampling is used in the design-based stereology to estimate the volume of a bounded object from the systematic sections of three dimensional objects. The variance approximation formula is used for the variance estimation. Although the variance approximation formula obtained from the properties of measurement function is better one than the old ones, the new one depends on an exact $(1-\mathrm{x}^2)^{\mathrm{q}}$ form for the measurement functions constructed from three dimensional objects, which affects to estimate accurately the variance estimation of systematic sampling. The smoothness constant q formula for the variance approximation is stable provided that a class of measurement functions with exact $(1-\mathrm{x}^2)^{\mathrm{q}}$ form is used. Thus, an approximation to variance estimation depends on the chosen measurement functions. Simulation result shows that the q values in covariogram model for representing the shape of three dimensional ellipsoidal objects take the values not only on [0,1] but also except on [0,1].

Keyword(s): Systematic sampling, Stereology, Simulation

Rathie–Swamee Asymmetric Bimodal Distribution

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Rathie–Swamee (RS) is based on the generalized logistic distribution. The parameters of RS and its analytical expression of RS permit us to get the unibimodal and bimodal distributions. The skewness parameter is added to construct the different unequal probabilities for the unibimodality and bimodality. Thus, the asymmetry in a dataset can be modelled efficiently. The parameters of RS are reparametrized to model the data around location efficiently. The properties of the proposed distribution are presented and also the heavy-tailedness is examined by means of tools showing that the distribution is heavy-tailed. Real data sets are applied to show the modelling capability of the proposed distribution. A comparison among the distributions is given to show the modelling competency of the proposed distribution.

Keyword(s): Modelling, Distribution theory, Asymmetrization

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Series Solutions of Homann Flow of a Micropolar Fluid with HAM Analysis

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This study deals with the problem of the steady three-dimensional stagnation-point flow of an incompressible micropolar fluid. The governing partial differential equations of micropolar fluids are reduced into a set of highly non-linear ordinary differential equation system by using the appropriate similarity transformations. The resulting system has no analytical solution, therefore a semi-analytical method namely, the homotopy analysis method (HAM) is applied to solve these non-linear ordinary differential equations. Velocity and microrotationcomponentsare obtained in series form. The influence of the flow parameters on the velocity andmicrorotationfields are displayed in plots. Moreover, the results are compared with the results obtained by the MATLAB routine BVP4c. The comparison shows that the HAM can easily achieve good results in predicting the solutions to such problems.

Keyword(s): Homotopy analysis method (HAM), Micropolar fluid, Stagnation point flow.

Semi-Analytical Solution of Heat Transfer in HiemenzFlow of a MicropolarFluid

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The problem of the heat transfer and fluid flow towards horizontal plates has important applications in many engineering processes such as the boundary layer along material handling conveyors, the aerodynamic extrusion of plastic sheet, and the cooling of an infinite metallic plate in a cooling bath. In the present study, the coolant is considered as a micropolar fluid and the heat transfer and fluid flow problems in two-dimensional stagnation point flow are investigated. By using appropriate similarity transformations, the governing equations of the micropolar fluids are reduced to ordinary differential equations. The resulting equations are solved with the homotopy analysis method (HAM) and expressions for velocity, microrotation, and temperature fields are obtained in serial form. These fields are presented in graphical form for flow parameters. Finally, heat transfer rate from the plate is presented in tabular form and discussed carefully.

Keyword(s): Heat transfer, Homotopy analysis method (HAM), Micropolar fluid, Stagnation point flow.

On Augmentation Ideals of Group Rings

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Let R be a commutative ring with unity, G a group and RG the group ring of G over R. The kernel of the R-homomorphism ε:RG→R is called the augmentation ideal of RG. In this study, we will investigate the relationships between augmentation ideals of group rings and some special modules such as group modules and derived modules.

Keyword(s): Augmentation ideal, Group ring, Group module.

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On Regular G-set Modules

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Let R be a commutative ring with unity, M a module over R and S a G-set for a finite group G. A G-set module MS over a group ring RGis the set of all formal finite linear combinations of the form having the elements of S as the basis and the coefficients fromR-module M. In this study, we give a characterization for the regularity of a G-set module MS according to the regularity of the R-module M and the properties of finite group G and its subgroups.

Keyword(s): Regular module, G-set, Group ring,

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Approximation by Baskakov-Stancu Operators Based On (p, q)-Integers

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The purpose of this presentation is to construct the Stancu type Baskakov operators by using (p,q)-integers. Post-quantum calculus, namely (p,q)-calculus is a generalization of q-calculus. The extra parameter p gives flexibility to the approximation. After the construction,we study the rate of convergence with the help of modulus of continuity and by using Peetre's K-functionals. Also, we deal with the pointwise estimation of the constructed operators for continuous and bounded functions in a Lipschitz space and a Lipschitz type maximal function. Finally, we illustrate the convergence of the constructed operators to some functions.

Keyword(s): (p,q)-integers, Baskakov-Stancu operators, weighted Korovkin theorem

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A Numerical Method for Solution of Gilson-Pickering Equation

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In this study, the finite element method is studied for the numerical solution of the Gilson-Pickering equation which is the one of the evolution equations.These type of equations have been the interest of many studies in various branches of applied sciences such as fluid mechanics, plasma physics, etc.The time discretization of this equation is obtained by the Crank-Nicolson method. To obtain the space discretization of the equation, the collocation method based on the quartic B-spline function is applied. Since the Gilson-Pickering equation is a nonlinear third-order partial differential equation, the nonlinear terms are linearized using quasi-linearization technique. Numerical solution obtained by the proposed method is compared with the exact solution and the existed studies.

Keywords: Gilson-Pickering equation, Collocation method, Quartic B-spline functions.

High Order Single Step Methods for Advection-Diffusion Equation

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The advection-diffusion equation (ADE) is the most famous one in the modelling of some physical phenomena like heat transfer in a draining film, dispersion of tracers in porous media,the intrusion of salt water into fresh water aquifers, the spread of pollutants inrivers and streams.In this study, a high accurate numerical method is considered for the numerical solution of the ADE. To obtain the numerical solution of the ADE, the Galerkin finite element method based on quintic B-spline functions is used for the space discretization. At the same time, the second-order, fourth-order and the sixth-order single step methods for the time discretizationare applied the space discretized form of the ADE. The results obtained by both of the proposed methods are compared. By this study, to obtain high accuracy solutions the effectiveness of time discretization is clearly seen.

Keywords: Galerkin finite element method, Single step methods, Advection-diffusion equation.

Effects of consecutive water level fluctuations and harvesting on predator-prey interactions

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In lakes, water level can alter the physical environment and may influence predatory fish performance. In this communication, we ask how do variations in water level affect population cycles? We use a predator-prey model that includes fishing terms as a case study. With the help of a continuation theorem based on Gaines and Mawhin's coincidence degree, we establish sufficient conditions for the existence of at least four positive periodic solutions. Our theoretical results confirm the assumption that the water level exerts a strong influence on the interaction between fishes. An example is given to illustrate the effectiveness of our results.

Keyword(s): Predator-prey model, Periodic solution, Coincidence degree.

The Effect of Inside-Out Classroom Education Method on the Academic Success of Prospective Teachers

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Communication in the 21st century that we have referred to as knowledge era has reached an inevitable need for individuals who display their existence in every area of society. In the previous years, distance education applications, which were considered as a dream for societies, have become easily experienced through the global communication network with the help of advances in information technologies(İşman, 2008).Educators should help students learn and be assertive that they use technology best (Strayer, 2012). Unlike learning of lessons only in the classroom and doing of homework in a home environment, reaching out to the learning contents outside the school, performing the specified activities, performing homework or activities in the classroom environment, and teacher's individual contribution can help them to achieve (Torun andDarkut, 2015).The inside-out classroom application is a method of education that has recently started to be seen in the literature. The inside-out classroom education is also an approach that begins with online education before the student comes to the classroom(Kara, 2016.b). In this method, there is a contrasting practice to the traditional method. In contrast to the traditional class model, this class model makes it easier to learn by internalizing conceptual information with technology that speeds up the transfer process of information. This method is on the way to becoming a method that produces an alternative solution to the fact that the only transfer place of information is a class.

The aim of this study is to investigate the effect of inside-out class education model for geometry class on students' academic achievement. This study was carried out with 45 second grade teacher candidates in the faculty of education of a state university.In spring 2016-2017, the first year, students were taught geometry by classical methods. Then, in the fall period 2017-2018, the second year, geometry applications were taught with the inside-out class model. The videos that were taken for 12 weeks were presented to the students and activities were intensively carried out in the class. The research consists of a weak experimental pattern in the single group as a pre-test final test.As data in the study, students' grades for the spring semester of 2016-2017 and the fall semester of 2017-2018 were examined. A t-test was used to compare the pre-test and final tests of the students in the same group. According to the results, there was a significant difference in favor of the final test. In this paper, we can discuss the inside-out class education model applied in the

geometry lesson has affected the academic achievements of the prospective teachers positively.

Keyword(s): Inside-out,classroom, Geometry,Prospective teachers

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Compact Operators on Some New Sequence Spaces

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It is natural to find conditions for a matrix mapping between BK-spaces to define a compact operator since a matrix transformation between these spaces is continuous. One way to achieve this is to apply the Hausdorff measure of noncompactness.

In this presentation, we characterize some classes of compact operators given by a special matrix. For this purpose, we apply the Hausdorff measure of noncompactness and use some known results.

Keyword(s): Sequence spaces, Hausdorff measure of noncompactness, Compact operators.

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Lower bounds for the operator norms of some matrices on a new space

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A lower bound for a matrix operator $A: X \to Y$ is the value of L satisfying the inequality

$$\|Ax\|_Y \geq L\|x\|_X.$$

This inequality has some applications in functional analysis. For example; it is used to obtain necessary and sufficient conditions under which the operator has an inverse.

In this presentation, the problem of finding norms and lower bounds for certain matrix operators is considered on a new space.

Keyword(s): Sequence space, Matrix operator, Lower-Upper bound.

A version of the Saks-Henstock Lemma for ordered integrals in the Riesz space

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In this paper we prove a version of the Saks-Henstock Lemma for (oM)-integral ((oH)-integral, strongly (oM)-integral,) integrals with values Banach lattice. We have used it to prove that one interesting difference between these kind of integration is the fact that the (oH)-integral possess the properties represented by Hake theorem.

Keyword(s) Banach lattice, (oH) and (oM)-integral, Hake theorem.

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The (o)-convergence properties of ordered integrals in Riesz space

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Recently, there are many paper paying attention to the integration in Riesz space. There is introduced and studied the notions of order-type integrals, for functions taking their values in ordered vector spaces, and in Banach lattices. In this paper we prove some convergence theorems of order- Mcshane (Henstock- Kurzweil) equi –integrals on Banach lattice and arrive same result in L-space as on Mcshane (Henstock Kurzweil) norm-integrals.

Keyword(s) Riesz space, Henstock integral, Mcshane integral, (o)-convergence,

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Generalized Kantorovich operators and their limit semigroup

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In this talk, we present a sequence of positive linear operators acting on function spaces defined on an arbitrary convex compact subset K of $\mathbf{R}^{\mathbf{d}}$, $d\geq 1$, introduced in [1]. Their construction depends on a given Markov operator, a positive real number, and a sequence of Borel probability measures. By considering special cases of these parameters for particular convex compact subsets, we obtain the classical Kantorovich operators defined in the 1-dimensional and multidimensional setting together with several of their wide-ranging generalizations. In the talk, we discuss the approximation and the preservation properties of these operators.

Moreover (see [2]), we disclose their relationship with the Markov semigroup (pre)generation problem for a class of degenerate second-order elliptic differential operators, which naturally arise through an asymptotic formula, as well as with the approximation of the relevant Markov semigroups in terms of the approximating operators themselves. The analysis is carried out in the context of the space C(K) of all continuous functions on K, and, in some particular cases, in $L^p(K)$ spaces, $1\leq p<+\infty$.

Keyword(s): Kantorovich operators, Approximation of semigroups, Markov operators

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Regularized Legendre-Galerkin method for Fredholm integral equations of the first kind

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In this talk, a numerical approach based on the Legendre-Galerkin Method is proposed to approximate the solution of Fredholm integral equations of the first kind. We also establish some error estimates are also given under a suitable assumptions on the exact solution. Finally, some numerical examples will be stated to show the accuracy of this method.

Many problems in applied mathematics and engineering can be formulated as Fredholm integral equations of the first kind:

$$Kf(x) = \int_a^b k(x,y)\, f(y)dy = g(x)$$

where the kernel k(;) and the right-hand side g are smooth real-valued functions.

The determination of the solution f of this equation is an ill-posed problem in the sense of Hadamard; in the sense that the solution (if it exists) does not depend continuously on the data.

In this work, we suggest a numerical procedure based on the Legendre-Galerkin projection method, where the solution is projected onto a subspace generated by Legendre polynomials.

Keywords: Fredholm integral equation of first kind, ill-posed problem, Legendre-Galerkin method.

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Testing Usubilitiy of QR Code in Web Services with SOAP Protocol

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Cloud environment is expected that the cloud environment will be environment without boundaries and that the clients and servers in this environment will communicate efficiently. Otherwise communication will have to be limited. At that time, the concept of internet environment has to be introduced again in the concept of cloud which is used instead of internet environment. In this study, it is aimed to use square codes in different forms and to find optimum solutions to the desired situation so that square codes can be used for efficient communication in the cloud environment. When the concept of quality is discussed in the cloud environment, requests on both sides must be met both client and server side. But in such an environment, increasing one's productivity is a problem for the other. This can be achieved by the fact that the quality of the quality of communication between the two ends, not between them, is more efficient. The main aspects of this work are: the structure of square chapters and web services, communication with data matrix in web services in different formats and differences in encrypted and unencrypted message communication.

Keyword(s): HTTP protocol, secure environment, communication channel, quality criteria, image communication.

Didactic conceptual sheets as complementary approach in flipped learning: Statistics and Biology

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In the spirit of closing the gap between "classroom and distance learning", we propose a method to overcome some of the challenges inherent in teaching statistics to students enrolled in blended learning. Among the teaching techniques identified as essential, we have articulated most of our strategy to a "Flipped Learning" model. Building on existing research, we have developed a complementary approach that use the results of many researches in Flipped Learning, ICT and Didactics. This complementary approach, articulated on didactic conceptual sheets, has been used in teaching descriptive statistics for students in biology (Biostatistics).

In this article, we describe the activities developed for the implementation of didactic conceptual sheets in a "Flipped Learning" course. We have distinguished the effectiveness of this learning opportunity to help students improve their understanding of concepts related to statistics and biology. We have also identified concepts and misconceptions that need to be highlighted and clarified in a biostatistics course.

In light of our observations, we recommend a complementary training strategy (didactic concept sheets) that can be used in an interdisciplinary approach that articulates Mathematics-Biology in a flipped learning model.

Keyword(s): Interdisciplinarity (Math–Biology), Flipped learning, Didactic Conceptual Sheets, Misconceptions, Teacher practices

An Application of Semi-exponential Type Operators

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In paper [1] Ismail and May consider exponential operators

$$S_\alpha(f,t) = \int_R W(\alpha,t,u)f(u)du$$

with the normalization condition

$$\int_R W(\alpha,t,u)du = 1,$$

where$W$ – the kernel of S_α is a positive function satisfying the following homogenous partial differential equation

$$\frac{\partial W}{\partial t}(\alpha,t,u) = \frac{\alpha}{p(t)}W(\alpha,t.u)(u-t),$$

$p = p(t)$ is analytic and positive for $t \in (A,B)$ with some $-\infty \leq A < B \leq \infty$ and $\alpha > 0$.

The operators S_α are approximation operators and they preserve linear functions.In paper [2] there is an extension of the above definition for so-called semi-exponential operators. In this case, operators $S_\alpha$fulfill the following equation

$$\frac{\partial W}{\partial t}(\alpha,t,u) = \frac{\alpha}{p(t)}W(\alpha,t.u)(u-t) - \beta W(\alpha,t,u),$$

β is a non-negative real number, $\alpha > 0$ and $u,t \in (A,B)$. We will investigateproperties of semi-exponential operators. Among other things we shall present some special cases of them connected with Bessel functions.

Keyword(s): Exponential Operators, Modified Bessel Functions, Differential Equations,

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Multistep Hermit Collocation Method for Solving Stochastic Fractional Integro-Differential Equations

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The main concern of this study is to propose high order multistep collocation method for evaluating the numerical solution of stochastic fractional integro-differential equations of the form

$$D^{\alpha}\xi(t) = \vartheta(t) + \int_0^t \kappa_1(s,t)\xi(t)dt + \int_0^t \kappa_2(s,t)\xi(t)dB(t), \qquad 0 \le t \le 1, \tag{1}$$

with initial conditions

$$\xi^{(j)}(0) = \xi_j, \qquad j = 0,1,\dots,\lfloor\alpha\rfloor,$$

where ξ, ϑ and $\kappa_i, i = 1,2$ are the stochastic processes defined on same probability space and $B(t)$ is a Brownian motion and all Lebesgue and It'o integrals in the integral form of (1) are well defined. For this purpose the unknown function $\xi(t)$ is approximated by Hermit interpolation and its Caputo fractional derivatives are calculated and substituted in equation (1). Also using some concepts of financial mathematics, It'o integral in main problem transform to classic Stieltjes integral. Then utilizing multistep collocation method, obtained equation reduces to some algebraic system. Illustrative examples are given for showing the efficiency and accuracy of the method.

Keyword(s): Stochastic fractional integro-differential equation, Multistep collocation method, Hermit interpolation,

Utilizing B-Spline Operational Matrices for Solving a Class of Nonlinear Boundary Value Problems Arising in Chemical Reactor Modelling

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The mathematical model for an adiabatic tubular chemical reactor which processes an irreversible exothermic chemical reaction can be reduced to some nonlinear boundary value problem as

$$u''(x) - \lambda u'(x) + \omega\big(x, u(x)\big) = 0, \qquad 0 \le x \le 1, \tag{1}$$

subject to the following boundary conditions

$$u'(x) = \lambda u(0), \qquad u'(1) = 0, \tag{2}$$

where $\omega\big(x, u(x)\big) = \lambda\mu(\beta - u(x))e^{u(x)}$ and λ, μ and β are the Peclet, Damkohler number and the dimensionless adiabatic temperature rise, respectively, which are impressive in determination of the steady state temperature of the reaction. In fact the steady state temperature of the reaction is equivalent to a positive solution $u(x)$ of equation (1). In this work cubic B-spline wavelets and their operational matrices of derivative and integration via some projection methods are applied for evaluating numerical solution of this problem. B-spline wavelets have significant properties such as; having compact support, vanishing moments and semi-orthogonality. Properties of these wavelets via some projection methods leads to the nonlinear problem transform to some algebraic system. For study of effect of involved parameters in main problem and for showing the accuracy and efficiency of the introduced methods some cases of main problem are given and findings are compared with the results of alternative methods. On the other hand because of aforementioned properties of these wavelets the operational matrices of the introduced methods are very sparse.

Keyword(s): Cubic B-spline wavelets, Operational matrix of derivative and integration, Spectral methods
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Pre-service Teachers' Notion of Generic Example Proof

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Proof is an essential aspect of mathematical activity and central to mathematics. Yet despite proof being viewed as a crucial mathematical activity, neither its various roles in mathematics nor its nature has permeated K-12 education or have been well understood by students. As discussed by Hersh (1993), the primary purpose of proof in the classroom is to explain and to show why something is the case rather than just provide formal logic/proof. Generic example proofs have received special attention in the literature and are seen as an important aspect of producing justifications and proofs (e.g., Balacheff, 1987; Stylanides, 2007) since generic example serves not only to confirm an instance of a statement but to convey an argument to explain why such a statement is always true. Therefore, generic example proofs can be a crucial part of learning and teaching proof, especially at the K-12 level. However, there is no consensus on whether an argument using a generic example is a mathematical proof or not. In this paper, I see generic example as a viable argument and acceptable justification at K-12 grade levels. This study explores how preservice secondary mathematics teachers evaluate arguments that consist of generic examples. The data was collected at an undergraduate mathematics course designed to engage pre-service middle school teachers in proof-related activities as a means for developing the mathematical knowledge and skills needed for effectively teaching proof in middle school mathematics classrooms. The primary source of data was transcribed video data of class session, with additional sources of data consisting of classroom artifacts and tasks. I adapted Glaser and Strauss's (1967) constant comparison method to analyze the data. The initial results show that while evaluating arguments, students have a hard time to identify whether an argument that includes examples is an example-based argument or is a generic example proof. All students, except one, claimed that the generic example does not count as proof since it uses a specific case and does not use a general/formal language. Thus, they did not see the difference between example-based reasoning and generic example proof. However, one student stated that if a specific example is used to convey a general argument, then that can be count as viable proof. She went further and argued that a generic example can be expressed in general terms. Her justification helped other students develop a more robust understanding of generic example. The result suggests that most pre-service teacher notion of generic example does not fit with the desired outcome, yet if they have enough opportunities to engage in this kind of activities, they may well be prepared for teaching proof at the middle school level.

Keyword(s): Proof, Generic Example, Teacher Education

Analyzing Textbooks to Teach Proof Related Activities at Middle School Level

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Proof has received significant attention in mathematics at all grade levels, and is expected to be an important part of every student's education. Despite the importance given to proof, the corpus of existing literature has demonstrated that many secondary school teachers and pre-service mathematics teachers have difficulties constructing and understanding proofs (Knuth, 2002; Bieda, 2010). The mean reasons that many teachers find the teaching of proof difficult, often due to their beliefs about teaching proof and their perceptions that proof is not a mathematical practice that can be integrated into the curriculum at all grade levels (Knuth, 2002). Textbooks are a crucial link between intended and implemented curriculum because they provide teachers to identify content to be taught, to choose appropriate instructional strategies, and to assess students' learning. Considering several researchers that link between curricula and students' learning, in order to have an effective students learning of mathematics, especially proof, teachers need to understand and analyze their textbooks with a specific goal. For this reason, the purpose of this study is to examine how pre-service mathematics teachers identify and modify tasks/problems/activities in middle school textbook in Turkey. Twenty four pre-service teachers participated in this study and all attended a course called mathematical reasoning, justification, and proof for 14 weeks. At the end of the semester, the students were asked to analyze a unit of textbook with focus of numbers, algebra, geometry, and probability and statistics. Their main assignment was to identify tasks/problems/activities in middle school textbooks and modify tasks/problems/activities to teach mathematics reasoning, justification, and proof. The primary sources of data were students reports on textbook analysis and their classroom presentation on their reports. Open coding (Glaser and Strauss, 1967) used to analyze the data. The preliminary analysis showed that pre-service teachers were somehow successful while identifying tasks/problems/activities related to proof in the textbooks, but had a hard time while modifying them to teach proof. The students found that there were almost none tasks that specifically focus on proof related activities, but found some tasks that can be modified into proof-related activities. The main criteria for modifying the tasks for the students was to change the wording of the problem and add the word "proof" or "justification" on the problem root as the question. It is important to note that integrating their course with middle school textbook was a new idea for them. Thus, even though they presented a limited understanding of proof in textbooks, providing the opportunity helped them enhance their understanding of learning and teaching proof at middle school level.

Keyword(s): Reasoning and Proof, Textbook Analysis, Teacher Education

On Bäcklund Transformations of Adjoint Curvein Euclidean 3-Space

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In this paper, we study the Bäcklund transformations for the Adjoint Curve in the Euclidean 3-space. Firstly it is obtained some essential equations of theBäcklund transformation. After we give a new theorem, the Bäcklund transformations for the Adjoint curve in Euclidean 3-space.

Keyword(s):BäcklundTransformationsAdjoint curve, Euclidean space,

On Adjoint Curves According to the Modified Orthogonal Frame in Euclidean 3-Space

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This article presents some specific characterization of adjoint curves. Firstly, the relationship between a curve and its adjoint curve are given in Euclidean 3-space. Then, these curves are examined with examples according to the modified orthogonal frame with curvature.

Keyword(s): Adjoint curve, Modified Frame, Euclidean space,

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3-6 July 2018, Istanbul, Turkey

On Statistically Convergent Function Series

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In this article, we introduce the concepts statistical convergence functions series. Furthermore we give the concept of uniform statistically convergence function series. Some properties are studied and interesting results are established.

Keyword(s): Function Series, Statistical Convergence

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Analytical solution of the Fractional initial Emden-Fowler equation using the fractional residual power series method

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In this paper, we study the solution of the fractional initial Emden-Fowler equation which is a generalization to the initial Emden-Fowler equation. We implement the fractional power series method (RPS) to approximate the solution of this problem. Several examples are presented to show the accuracy of the presented technique.

Keywords: Fractional Emden-Fowler equation, Caputo derivative, Generalized Taylor series, Residual power series.

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On Tauberian Remainder Theorems for the ℓ and $\ell^{(k)}$ Methods

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Let $u = (u_n)$ be a sequence of real numbers. The logarithmic (shortly ℓ) and $\ell^{(k)}$ mean of (u_n)aredefined by

$$\ell_{n,1}(u) = \frac{1}{\gamma_{n,1}} \sum_{k=0}^{n} \frac{u_k}{k+1}$$

and for each positive integer k

$$\ell_{n,1}^{(k)}(u) = \frac{1}{\gamma_{n,1}} \sum_{t=0}^{n} \frac{\ell_{t,1}^{(k-1)}(u)}{t+1}$$

respectively, where$\gamma_{n,1} = \sum_{k=0}^{n} \frac{1}{k+1} \sim \log n$.

If the limit of $\ell_{n,1}(u)$as $n \to \infty$exists, then the sequence(u_n) is said to be summable by ℓ method and if the limit of $\ell_{n,1}^{(k)}(u)$as $n \to \infty$exists, then the sequence (u_n) is said to be summable by $\ell^{(k)}$ method. In this work, we prove some Tauberian remainder theorems for the logarithmic summability methods ofℓ and $\ell^{(k)}$.

Keyword(s): Tauberian remainder theorem,λ-bounded sequence, Logarithmic summability method.

Tauberian Conditions Under Which Ordinary Convergence Follows From Logarithmic Summability Method of Integrals

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Let f be a real valued function which is continuous on $[1,\infty)$ and $s(x) = \int_1^x f(t)\,dt$. The logarithmic mean of $s(x)$ is defined by

$$\ell(x) = \frac{1}{\log x}\int_1^x \frac{s(t)}{t}\,dt.$$

If the limit $\lim_{x\to\infty}\ell(x) = s$ exists, then we say that the improper integral $\int_1^\infty f(t)dt$ is said to be summable by the logarithmic summability method to a finite number$s$.
A function $s(x)$ is said to be slowly oscillating with respect tologarithmicsummabilitymethodif

$$\lim_{\lambda\to 1^+}\limsup_{x\to\infty}\sup_{x<t\leq x^\lambda}|s(t)-s(x)| = 0$$

holds. Our goal in this paper is to obtain some Tauberian theorems for the logarithmic summability method of integrals in terms of the concept of slow oscillation.

Keyword(s): Slowly oscillating function, General logarithmic control modulo, Logaritmic summability method.

On Universal Bernoulli Polynomials

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The aim of this talk is to extend universal Bernoulli polynomials and discuss several properties for them.

Keyword(s): Generalized Bernoulli polynomials, Formal group.
Acknowledgement: This work was supported by The Scientific Research Projects Coordination Unit of Akdeniz University. Project Number: FBA-2018-3593.

Finite Difference Solution of the Klein-Gordon Equation in Curved Spacetime

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We are interested in the initial-boundary value problem for the Klein-Gordon equation in de Sitter spacetime. In this work, we consider the finite difference method for the numerical solution of the Klein-Gordon equation in de Sitter spacetime. We have used the central difference approximation for the time variable and Crank-Nicolson method for the spatial variable. In order to show the accuracy of the results for the solutions, we used the implicit method.

Keyword(s): Finite difference method, De Sitter spacetime , Klein-Gordon equation.

Finite Element Solution of the Klein-Gordon Equation in de Sitter Space time

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We consider the initial-boundary value problem for the Klein-Gordon equation in de Sitter spacetime. In [1], Yagdjian and Galstian obtained the fundamental solution of the linear Klein-Gordon equation. The energy estimates of this equation were showed by Nakamura in [2]. A differential transform method and variational iteration with Adomian polynomials method were presented for the Higgs-Boson equation in [3]. In this work, we consider the finite element method for the numerical solution of the Klein-Gordon equation in de Sitter spacetime.

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Keyword(s): Finite element method, Numerical solution, Klein-Gordon equation

On the Bertrand Dual Bezier Curve Pairs

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In literature it is well known that a Bertrand curve α is a curve whose unit principal normal is the unit principal normal of another curve β. These curve pairs {α,β} are called Bertrand curve pairs.

In this paper we study Bertrand dual Bezier curve pairs. Let two Bezier curves of degree n with control points $\{b_i\}_{i=0,1,\dots,n}$ be given in the space of dual vectors D^3. We investigated the conditions of being Bertand curve pairs of these Bezier curves. So we stated these conditions as control points $\{b_i\}_{i=0,1,\dots,n}$ of given Bezier curves.

Keyword(s): Bertand curve, Bezier curve, dual vectors.

Some approximation properties by a class of bivariate operators

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In this paper, we introduce a bivariate generalization of the Schurer-Stancu operators based on q-integers and get a Bohmann-Korovkin type approximation theorem of the considered operators. Some estimates of the rate of convergence using the proposed operators are considered and a Voronovskaya theorem is also presented. In the last section, some numerical considerations based on Matlab algorithms are presented.

Keywords: positive linear operator, bivariate Bernstein-Schurer-Stancu operators, Bohman-Korovkin type approximation theorem, modulus of continuity, Voronovskaya theorem

Charlier-Szász type operators which preserve polynomials

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The aim of this paper is to present a family of sequences of Charlier-Szász type operators which are modified the King-type reproduced $e_2 + \alpha e_1$, for $\alpha \geq 0$. Also a Voronovskaya type result is presented, as well. Lastly, we investigate order of approximation in the sense of local approximation results with using a classical approach, the second modulus of continuity and Peetre's K-functional.

Keyword(s): Szász type operators, King type operators, Charlier polynomials, Voronovskaya type theorem, modulus of continuity.

Numerical Solutions of Lotka-Volterra Equations by a Weighted Residual Scheme Using the Method of Least Squares

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Lotka-Volterra equations are a pair of nonlinear ordinary differential equations that describe the populations of two animal species having a predator-prey type relation. In this study, we attempt to find numerical solutions to this nonlinear system which minimizes the L_2-norm of the residual of a function belonging to a chosen trial space. We also investigate how the choice of the trial space affects the accuracy of the obtained solutions.

Keyword(s): Lotka-Volterra equations, Nonlinear differential equations, Numerical solutions, Weighted residual method.

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Numerical Solutions of One-Dimensional Convection-Diffusion Equation by a Galerkin-Like Method Using Polynomial Basis

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The convection-diffusion equation describes physical phenomena where quantities inside a system are transferred due to both convection anddiffusion. In this study, we obtain numerical solutions of one-dimensional convection-diffusion equation by using a Galerkin-like scheme encompassing polynomial bases. After describing the method in terms of some auxiliary matrices, we demonstrate it on an example problem.

Keyword(s): One-dimensional convection-diffusion equation, Partial differential equations, Numerical solutions, Galerkin method.

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A New BK-Space Defined by Regular Matrix of Lucas Numbers

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In this work, our main goal is to introduce the space $\ell_p(E)$ with the help of a new regular matrix of Lucas numbers for $0 < p < \infty$. On the other hand, we analyze some topological properties and examine geometric structure related to convexity of the sequence space $\ell_p(E)$.

Keyword(s): Lucas number, Sequence space, Geometric properties

On the Weighted Mixed Almost Unbiased Liu Type Estimator

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A new version of weighted mixed estimator based on prior information in stochastic linear restricted model has been introduced for the unknown vector parameter when stochastic linear restrictions on the parameters hold. The performance of the proposed estimator as a generalization of the weighted mixed estimator (WME), the almost unbiased Liu estimator (AULE) and the least squares estimator (LSE) has been given in terms of the mean squares error matrix. Finally, numerical example from literature and simulation study have been given to illustrate the results.

Keywords : mixed model; Stochastic linear restrictions

An Investigation of Middle School Preservice Mathematics Teachers’ Knowledge of Statistics and Teaching

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Developing students’learning outcomes is closely associated with improving the quality of the teaching (Guerriero, 2017). For this reasonteachers should know the teaching methods, appropriate representations and determine proper examples for students (Ball, Thames, & Phelps, 2008). But studies showed that teachers have some difficulties about knowledge of content (statistics) and teaching (Burgess, 2011). In this study we focused on examining six senior preservice middle school mathematics teachers’ knowledge of statistics and teaching. Data were collected via 7 tasks and individual semi-structured interviews. Data were analyzed by content analysis. Results revealed that preservice teachers have some difficulties about teaching of different graphical representations appropriately. Their explanations about which graph is convenient while representing data included only the nature of data. They ignored the purpose of research questions. Also it was noticed that preservice teachers’ feedback about students’ mistakes related to the concept of median were limited. Furthermorepre-service teachers’ instructions which involve pie graphs didn’t take into consideration statistical investigation. However preservice teachers provided accurate feedback regarding students’ difficulties about bar graph. The findings of this research recommend that preservice teachers should be supported learning opportunities to teach statistical concepts.

Keyword(s): Knowledge of statistics and teaching, Preservice teachers,

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Asymptotically unbiased estimator for the tail index of Pareto-type distributions of right-truncated data

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In this paper, we propose a consistent estimator of the second-order parameter of Pareto-type distributions under random right-truncation and establish its asymptotic normality. Moreover, we derive an asymptotically unbiased estimator for the tail index and study its asymptotic behaviour. Our considerations are based on a useful Gaussian approximation of a tail product-limit process given recently by Benchaira et al. [Tail product-limit process for truncated data with application to extreme value index estimation. Extremes, 2016; 19: 219-251] and on the results of Gomes et al. [Semi-parametric estimation of the second order parameter in statistics of extremes. Extremes, 2003; 5: 387-414]. We show, by simulation, that the proposed estimators behave well, in terms of bias and mean square error.

Keyword(s): Extreme value index; Heavy-tails; Second-order parameter; Random truncation; Product-limit estimator,

A Lynden-Bell integral estimator for the tail index of right-truncated data with a random threshold

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By means of a Lynden-Bell integral with deterministic threshold, recently Worms and Worms [A Lynden-Bell integral estimator for extremes of randomly truncated data. Statist. Probab. Lett. 2016; 109: 106-117] introduced an asymptotically normal estimator of the tail index for Pareto-type (randomly right-truncated) data. In this context, we consider the random threshold case to derive a Hill-type estimator and establish its consistency and asymptotic normality. A simulation study is carried out to evaluate the finite sample behavior of the proposed estimator and compare it to the existing ones.

Keyword(s): Extreme value index; Heavy-tails; Lynden-Bell estimator; Random truncation.

Neighborhood system of soft identiy element of soft topological group

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Soft set theory is defined by Molodtsov in 1999. After this definition many autors has been contribute to this research area by defining soft groups, soft topologies and soft elements. After having the definition of soft topological space and soft group, the axiomatization of the concept is soft topological group is a natural procedure. The aim of this study is to introduce the neighborhood system of soft identity element of soft topological groups by using the soft element which is defined byWardowski in 2013.

Keyword(s): Soft topological group, Soft topological space, Soft set,
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Some Results on Soft Element and Soft Topological Space

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All over the globe, soft set theory is a topic of interest for many authors working in diverse areas due to its rich potential for applications in several directions since the day it was defined by Molodtsov in 1999. Moreover Soft set theory is free from the difficulties where as other existing methods viz. Probability Theory, Fuzzy Set Theory. Considering to these benefits Soft set theory has became very popular research area for many researchers. To contribute this research area, in this paper we examine some properties and results on soft element and soft topological space such as soft cluster and soft isoleted points of a soft set, boundary of soft sets andso on. Moreover we give some examples to clarif your definitions.

Keyword(s): Soft element, Soft topological space, Soft set,
Acknowledgement: Thiswork is supportedbytheScientificResearch Project of Muğla Sıtkı Koçman University, SRPO (no:16/001)

Regular Maps for Some Hecke Groups

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A map on a surface X is an embedding of a graph $\mathcal{G}$ into X with the property that the components of $X-\mathcal{G}$ are simply connected. We can then regard each of this components as polygonal cells. Thus, a map will have vertices and edges (from the graph) and faces (from the polygonal cells). An authomorphism of the map is an orientation-preserving homeomorphism of the surface that preserve the embedded graph and we regard two such homeomorphisms to be identical if they have same effect on the embedded graph $\mathcal{G}$. The map is called regular if its authomorphism group is transitive on the directed edges of the map. All the faces of a regular map will have the same valency (e.g. all faces of an icosahedron have valency 3, all faces of a cube have valency 4, e.t.c.). Now from the Hecke group H^q, we can construct a universal q-gonal map $\widehat{\mathcal{M}}_q$. For axample, $\widehat{\mathcal{M}}_3$ is the wellknown Farey graph.

The universal triangular map $\widehat{\mathcal{M}}_3$ has as its vertices the set $\mathbb{Q}\cup\{\infty\}$, where $\infty=\frac{1}{0}$, and two vertices $\frac{a}{b}$ and $\frac{b}{c}$ are joined by an edge if and only if $ad-bc=\pm 1$. We note the following facts about the tessellation $\widehat{\mathcal{M}}_3$:

(a) There is a tringle with vertices $\frac{1}{0},\frac{1}{1},\frac{0}{1}$; this is called the principal triangle.

(b) The group Γ acts as a group of automorphisms of $\widehat{\mathcal{M}}_3$.

(c) There is a triangle with vertices $\frac{a}{c},\frac{a+b}{c+d},\frac{b}{d}$.

Thus $\widehat{\mathcal{M}}_3$ is a triangulation of $\widehat{H}$. In [2] it is shown that every triangular map is a quotient of $\widehat{\mathcal{M}}_3$, in the sense that given a triangular map T on an orientable surface X, there is a subgroup M of Γ such that $\widehat{H}/M$ is conformally equivalent to X and $\widehat{H}/M=T$. Also any subgroup L of Γ gives rise to a triangular map $\widehat{\mathcal{M}}_3/L$ on the surface $\widehat{H}/L$. In this talk, we also discuss to construction regular maps for other well-known finitely generated Fuchsian groups.

Keyword(s): Regular maps, modular group, normalizer

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On Suborbital Graphs of the Normalizer

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It is known that the graph of a group provides a method by which a group can be visualized; in many cases it suggests an economical algebraic proof for a result and it gives same information but in a much more efficient way. In this view, the idea of suborbital graph has been used mainly by finite group theorists.

After it was shown that this idea is also useful in the study of the modular group which is a finitely generated Fuchsian group [1], some other finitely generated groups have been studied by suborbital graphs. One of them is the normalizer of $\Gamma_0(N)$ in $PSL(2,\mathbb{R})$ turns to be a very important group in the study of moonshine and for this reason has been studied by many authors. It consists exactly of the matrices

$$\begin{pmatrix} ae & b/h \\ cN/h & de \end{pmatrix}$$

where all parameters are integers, $e||N/h^2$ and h is the largest divisor of 24 for which $h^2|N$ with understandings that the determinant e of the matrix is positive and that $r||s$ means that $r|s$ and $\left(r,\frac{s}{r}\right)=1$ (r is called an exact divisor of s). We denote the normalizer by $\Gamma_B(N)$.

Since the group structure of $\Gamma_B(N)$ is much more complex than the modular group, its suborbital graphs have been studied under various restriction in many studies [2,3]. General case is still an open problem. In this talk, we discuss on it.

Keyword(s): Suborbital graphs, modular group, normalizer

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On solvability of a group of the given order type

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For a group G, let $\pi_e(G)$ denote the set of orders of elements of G and $T(G) = \{(n, m_n) : n \in \pi_e(G)\}$, where m_n is the number of elements of order n in G. Two groups G and S are of the same order type if and only if $T(G) = T(S)$. In 1987, J. G. Thompson posed an interesting problem related to algebraic number fields, which is Problem 12.37 in [3], as follows:

Thompson's problem. Let S be a solvable group. If G and S are of the same order type, is it true that G is also necessarily solvable?

Thompson's problem has been examined in various aspects, but nobody can solve it completely or even give a counterexample.

For a group H, let $k(H) = Max(\pi_e(H))$ and $M(H) = m_{k(G)}(H)$. In [1] and [2], it has been given the affirmative answer to Thompson's problem, where $M(S) = 4p$ or $2pqr$ such that $2 < p < q < r$ are distinct primes. In this talk, we are going to examine this problem by considering some other values of $M(S)$.

Keyword(s): Thompson's problem, Set of the element orders,

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Some Results on Generalized Tribonacci and Tricobsthal Polynomials via Generating Function Methods

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In this work, we investigate generating functions on generalized tribonacci and generalized tricobsthal polynomials which are defined first in [1]. We obtain families of bilinear and bilateral generating functions. After presenting these results, we derive special cases for the application of these polynomials in order to generating functions.

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Keyword(s): Generalized tricobsthal, Generalized tribonacci polynomials, Bilinear and bilateral generating functions.

On The Jacobi Polynomials

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In this study, we give new properties of the Jacobi polynomials by using similar approach in [1,2,3].The results obtained here include various families of multilinear and multilateral generating functions, integral representation and recurrence relations for these polynomials. In addition, we derive a theorem giving certain families of bilateral generating functions for the Jacobi polynomials and the generalized Lauricella functions. Finally, we get several results of this theorem.

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Keyword(s): Jacobipolynomials,Bilinearandbilateralgeneratingfunctions, Lauricellafunctions.

The Performance of Robust Cox Regression Analysis in The Violation of Proportional Hazard Assumption

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The maximum likelihood estimation method is a commonly used method of parameter estimation. The maximum likelihood method determines the parameter estimates which make maximum the likelihood function. For the parameter estimation of the Cox regression model, the likelihood function is replaced by the partial likelihood function. The partial likelihood function is influenced by the violation of assumptions. In this case, biased estimates and incorrect results are obtained and the model fails.The principal assumption of the Cox regression analysis is the proportional hazard assumption**.** This assumption is that the hazard ratio of any two individuals is constant over the time axis in the model. Robust estimation methods are designed to produce less biased estimates over a wide class of deviations from the assumptions. In this method, in the cumulative hazard function, the weight of observations with outliers is reduced. In this study, robust estimation is considered for Cox regression analysis in case of violation of proportional hazard assumptionand compared with classical Cox regression using the artificial data set.

Keyword(s): Cox regression, Robust Estimation, Outliers

The determination of the Effect of Missing Rate and Sample Size on Multiple Imputation Method

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In survival analysis, the Cox regression analysis is used to establish the cause-effect relationship between the covariates and the dependent variables. In Bayesian methods, the posterior distributionis obtained by combining information fromthe prior distribution of parameter andthe likelihood function and it is used for all inferences. In the Bayesian Cox regression analysis, the posterior distribution is obtained using the partial likelihood function as the likelihood function.Missing data are the real trouble to researchers in many of the areas. Because traditional statistical methods and software assume that the data sets are complete. Multiple imputation method develops to solve the problem of missing value in the data.Multiple imputation method consists of the imputation phase, the analysis phase and pooling phase. In this study, we evaluate the performance of the multiple imputation method by generating survival data with different sample size and different missing rate.

Keyword(s):,Multiple İmputation, Missing Value, Bayesian Cox Regression

Investigation of spectral analysis of discrete Klein-Gordon s-wave equations with spectral singularities

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In this study, we consider the spectral analysis of the boundary value problem (BVP) consisting of the discrete Klein-Gordon equation and the quadratic eigenparameter dependent boundary condition. Presenting the Jost solution and Green's function, we investigate the finiteness and other spectral properties of the eigenvalues and spectral singularities of this BVP under certain conditions.

Keyword(s): Eigenparameter, Spectral analysis, Eigenvalues.

A note on the matrix Sturm-Liouville operators with principal vectors

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Let L denote the operator generated in $L_2(\mathbb{R}_+,E)$ by the differential expression

$$l(y)=-y''+Q(x)y, \quad x\in\mathbb{R}_+:=[0,\infty)$$

and the boundary condition

$$(A_0+A_1\lambda+A_2\lambda^2)y'(0,\lambda)-(B_0+B_1\lambda+B_2\lambda^2)y(0,\lambda)=0,$$

where Q is a non-selfadjoint matrix valued function. With respect to the spectral properties of L, we investigate the properties of the principal functions corresponding to the eigenvalues and the spectral singularities of L.

Keyword(s): Eigenvalue, Jost solution, Principal function,

Some Spectral Problems in the Theory of Mixed Type Equation

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We use the spectral method for investigation of the Gellerstedt problem for Lavrent'ev-Bitsadze equation

$$\operatorname{sgn}(y)\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$$

in a half-strip with a Frankl condition on the type change line of the equation. Using the general solution of the given elliptic-Hyperbolic equation in the hyperbolic part we obtain the auxiliary p[problem for Laplace equation.

Also a problem from the theory of parabolic-hyperbolic equations with the spectral parameter in the boundary condition and with a nonzero complex coefficient d is considered

$$u''(x)+\lambda u(x)=0, \qquad u\in(0,1)$$
$$u(0)=0, \qquad u'(1)= d\lambda u(1).$$

We regard the case of appearing of a multiple eigenvalue by the eigenfunction and the associated function from the root subspace and removing of one eigenfunction with a simple eigenvalue. For the biorthogonal system we obtain the spectral problem with boundary conditions without a spectral parameter.

Keyword(s): mixed type equation, spectral problem, boundary value problem
Acknowledgement: The investigation is supported by the Russian Scientific Foundation (project 16-11-10194).

Modeling the Shape of Red Blood Cell Using the PDE Method

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This study aims to model the shape of a normal red blood cell (RBC) and two shapes of sickle cells using the partial differential equation (PDE). The development of this technique was based on the use of an elliptic PDE and a set of four periodic boundary conditions. The PDE method can generate surfaces of geometries from a small number of parameters. Furthermore, the shape of the surfaces generated by the PDE method is based on a boundary representation and can easily be modified since it is characterized by data distributed around the boundaries. In this study, the shapes of the generated PDE-based representation of a normal RBC and sickle cell has been sketched by using MATLAB program. The findings showed that the PDE method is suitable for representing the shape of a normal RBC and sickle cells. Besides that, the data regarding the radius and height from the normal RBC and one of the sickle cells, are then used to obtain four equations. These equations can be utilized for future prediction in designing both normal RBC and sickle cells. In conclusion, the PDE method can generate smooth parametric surface representations of any given shape of blood cells. The study implicates that the PDE method is capable of generating surfaces of complex geometries.

Keyword(s): Partial Differential Equation, Parametric surface, Geometric modeling, periodic boundary conditions.
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Lucas Matrix Method for a Class of Nonlinear Delay Fredholm Integro-Differential Equations

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Many physical phenomena in different fields of sciences and engineering have been formulated using integro-differential equations. Besides the nonlinear integro-differential equations play a crucial role to describe many process such as fluid dynamics, biological models and chemical kinetics, population, potential theory, polymerchemistry, drop wise condensation,etc. But, analytical solutions of nonlinear delay integro-differential equations, either do not exist or it's hard to compute. Due to this reason, it is required to obtain an effient numerical solution. In this study, we present an efficient numerical matrix method to solve aclass of nonlinear Fredholm integro-differential equations with constant delays, which is based on Lucas and Taylor polynomials together with collocation points. This technique reduces the solution of nonlinear problem to the solution of a matrix equation which corresponds to a system of nonlinear algebraic equations with unknown Lucas coefficients. Also, some examples along with residual error analysis are performed to illustrate the activity and applicability of the present method and a comparison is made with existing results.

Keywords : Lucas and Taylor polynomisls: Matrix method; Collocation points; Nonlinear Fredholm integro-differential equations; Residual error analysis.

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A New Generalization of Complex Stancu Operators

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In this paper, we investigate approximation properties of the complex form of an extension of the Bernstein polynomials, defined by means of a probabilistic method. We obtain some quantitative estimates and the exact order of approximation for these operators attached to analytic functions. Also, we prove that the new generalized complex Stancu operators preserve the univalence property of the original function.

Keywords: Complex Stancu operator, quantitative estimates, exact order of approximation, univalence.

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Multi Criteria Decision Making for Top Students Selection In Higher Education

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In an academic institution, the implementation of a structured reward system for the top students to be rewarded is crucial in order to acknowledge their significance in the institution. It could consistently motivate all the students to be a better individual, but often some conflicts arose during the decision process especially when there are several criteria are being considered. The purpose of this study is to suggest a selection method by using the Analytical Hierarchy Process (AHP), one of the methods in multi criteria decision making. The AHP is utilized to select the most suitable students to be rewarded based on four criteria which are academic achievement, co-curriculum activities, attitude and also communication skills. The students were ranked based on the criteria and their value. The overall priority value of the students was calculated by considering the priority of each criteria where the student with the highest priority value is the best student. By implementing the new reward system, the academic institution will be able to produce better quality students.

Keyword(s): Analytical Hierarchy Process, Multi Criteria Decision Making (MCDM), Pair-Wise Comparison, Best Student.
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η--Ricci Solitons in Kenmotsu Manifolds with Generalized Symmetric Metric Connection

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The objective of the present paper is to study the η-Ricci solitons on Kenmotsu manifold with generalized symmetric metric connection of type (α, β). There are discussed Ricci and η-Ricci solitons with generalized symmetric metric connection of type (α, β) satisfying the conditions $\mathring{R}.\mathring{S}=0$, $\mathring{S}.\mathring{R}=0$, $\mathring{W}_2.\mathring{S}=0$ and $\mathring{S}.\mathring{W}_2=0$. Finally, we constrct an example of Kenmotsu manifold with generalized symmetric metric connection of type (α, β) admitting η-Ricci solitons.

Keyword(s): Generalized Symmetric Metric Connection, Ricci Solitons, Kenmotsu Manifolds.

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Slant Submanifolds of Golden Riemannian Manifolds

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In this paper, we study slant submanifolds of Riemannian manifolds with Golden structure. A Riemannian manifold $(\tilde{M},\tilde{g},{\varphi})$ is called a Golden Riemannian manifold if the $(1,1)$ tensor field ${\varphi}$ on $\tilde{M}$ is a golden structure, that is ${\varphi}^{2}={\varphi}+I$ and the metric $\tilde{g}$ is ${\varphi}-$ compatible. First, we get some new results for submanifolds of a Riemannian manifold with Golden structure. Later we characterize slant submanifolds of a Riemannian manifold with Golden structure and provide some non-trivial examples of slant submanifolds of Golden Riemannian manifolds.

Keyword(s): Slant submanifolds , Golden structure, Invariant and anti-invariant submanifold.

Structure Equations and Constraint Manifolds for Spherical Chain in Lorentz Space

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Finding the structure equation of a chain is important to present the position of the end link on the chain. Furthermore, the structure equation helps to determine the constraint manifold of the chain. A chain can be open or closed.In Lorentz space, we study spherical open chain along this paper. Beforehand, we obtain the structure equations of a spherical open chain with reference to the first link of the chain. The structure equations change according to the causal characters of the first link. Later, we give the constraint manifolds of the chain by using these equations. Some geometric interpretations about the manifolds are attained.

Keyword(s): Spherical Open Chain, Constraint Manifold, Split Quaternion.

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Evaluation of High School Entrance Exam(Lgs) Mathematics Questions in Terms of Learning Fields of Mathematics and Determination the Level of Cognitive Skills

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The aim of this research is to determine the level of cognitive skills by comparing the Mathematics course questions asked in 2018 with the learning areas of 5-6-7 and 8th grade curriculum of Elementary Mathematics Teaching Program. The research data was obtained through a document review in the context of the qualitative research method. It has been taken from the Internet address of the Board of Education of the Ministry of Education for the learning areas included in the 2018 mathematics curriculum and from the internet address of the General Directorate of Education Services Department of the Ministry of National Education for the 2018 year LGS inquiries. In 2018, a total of 20 maths questions were asked to 8th grade students. The classification was re-examined by referring to expert opinions. Percent and frequency techniques are used in the framework of the analyzes made. As a result of this research analysis, it is seen that the LGS questions measure the cognitive skills at least at the application level.

Keyword(s): LGS, mathematics lesson, cognitive skill, learning area

Fibrations of 2-Crossed Modules

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In this study, we basicly show that the functor from the category X_2Mod of 2-crossed modules of groups to the category Groups of groups assigning to each 2-crossed module $\{L,M,P,\lambda,\mu\}$ the group P and to each 2-crossed module morphism (f_2,f_1,f_0) the group homomorphism f_0 is a fibration. In addition, we study some related properties.

Keywords: Crossed Module, 2-Crossed Module, Fibration, Pullback.

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The Effect of Differentiated Instruction on Mathematical Success of Third Grade Primary School Learners

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This research was designed to determine the effect of differentiated instructional approach on the achievement of mathematics in elementary school third grade students. It is designed designed on semi-experimental model with pretest and posttest control group. This study has been conducted in a state primary school in Ceyhan, Adana within third grade learners that have a low socioeconomic level. In this study, experimental and control groups have been formed by 40 students that have similar academical success and parental education level and whose sex have been dispersed homogeneously. The experimental group of the study has been formed by semi-randomly selected 20 students who got similar points from tests and had similar learning styles. The control group of the study was the other class on the same grade. During the application, the topic of “Fractions” was taught by Differentiated Instruction Method in the experimental group, while it was taught by Traditional Method in the control group according to the course book of mathematics. In the experimental group, the courses were taught by the researcher and in the control group it was taught by the teacher of the class. The data has been collected by using “Mathematics Achievement Test” and “Learning Styles Scale” “Mathematics Achievement Test” has been applied to both experimental and control groups as pretest, posttest and permanence test. “Learning Styles Scale“ has been applied to only the experimental group during the lesson. One factor Ancova has been used in order to find out whether the Differentiated Instruction Method has any statistical effects on the points of Mathematics Achievement Test” before and after the experiment. According to the data obtained at the end of the research, there is a significant difference in the post test results of achievement test in favor of the experimental group.

Keyword(s): Mathematics education, mathematics achievements, differentiated instruction method, fractions

Fibrations and Cofibrations of Bimodules over Associative *R*-Algebras

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In this work, provided that R is a commutative unitary ring with $1 \neq 0$ we study on fibrations and cofibrations of the category BModAl_R of bimodules over associative R-algebras over the product category $\mathrm{Al}_{1R}\times\mathrm{Al}_{1R}$ where Al_{1R} is the category of associative unitary R-algebras. We also explore some related properties.

Keywords: Fibration, Cofibration, Associative Algebra, Module, Bimodule.

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On Some Vector-Valued Sequence Spaces Generated By Multiplier Sequences

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In this study we examine the Köthe-Toeplitz duals of vector valued sequence spaces $c(X,\lambda,p)$ and $l_{\infty}(X,\lambda,p)$ and we characterize some classes of matrix transformations defined on them.

Keyword(s): Vector-valued sequence spaces,Köthe-Toeplitz duals, Matrix transformations.

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On Close-To-Convexity of Normalized Analytic Functions

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In this paper we derive sufficient conditions for close-to-convexity of certain normalized analytic functions. It is shown that a convex function is close-to-convex of order 2^{-r} in $\mathcal{U}$, where r is a positive integer.

Keyword(s): Analytic functions, univalent functions, starlike functions, close-to-convex functions, subordination principle.

A Data Hiding Method based on Fibonacci Numbers

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Nowadays security is getting more important in data transfer process.To ensure security while sending data in communication channel, different methods are developed.In this study, an encryption method based on Fibonacci numbers is examined.

Kyword(s): Cryptography, Steganography, Fibonacci Numbers

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On the Complexiton Solutions of Generalized Bilinear Equations via Extended Transformed Rational Function Method

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Generalized bilinear equations are in need of being investigated and solved for being not familiar than other commonly known bilinear equations [1]-[2]. In this work, we show applicability of extended transformed rational function method to generalized bilinear equations. Extended transformed rational function method paves a way for obtaining trigonometric and hyperbolic function solutions together [3].

Keyword(s): Complexiton Solutions, Extended Transformed Rational Function Method, Generalized Bilinear Equations.

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Problem Solving Competencies of Mathematics Teachers During Concrete Operational Stage

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There is no doubt that the most basic component of the education system aiming to educate more qualified and creative student who are contemporary with the present day is the teacher. The teacher brings about qualified and efficient education process in accordance with this aim and taking notice of students’ levels. The 5th grade was included in to secondary stage with the alteration “4+4+4 system” in 2012 in Turkey. Then the starting age to school is decreased to 66 month (even 60 month with the permission of parents) from 72 month. Owing to the alteration it was the first experience forsecondary school mathematics teachers with the students in the concrete operational stage. Thereby it becomes crucial for secondary school mathematics teachers to use appropriate problem solving strategies and mathematical representations suitable for the students in concrete operational stage aged 10 to 11.The purpose of this study wasto determine the problem solving skills and competencies of the secondary school mathematics teachers during the concrete operational stage. In this research qualitative approach is used and the methodology is a case study. The study is carried out together with five teachers having different occupational experience. Data collection is done by developing interview forms and a problem solving test. In the first step,in order to determine the difficulties that teachers face in problem solving in 5th grade classes “Interview Form-I” is used. In the second step, a problem solving test, consisting of four questions which are appropriate to solve both in concrete and formal operational stages, is applied due to determine teachers’ problem solving approach in secondary stage. In the last step “Interview form-II” is used to specify how teachers gain their effectiveness regarding their problem solving strategies and mathematical representations. Semi-structured interviews and teachers’ individual problem solving process is recorded and the data subjected to descriptive analysis.Findings indicate that teachers generally develop a solution for both cognitive stages yet the factors differ in gaining experience concrete operational stage applications.

Key Words: Problem Solving Competencies, Secondary School Mathematics Teachers, Concrete Operational Stage

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On Approximation Properties of Baskakov-Kantorovich Type Operators Preserving Exponential Function

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In this paper, we focus on a generalization of the Baskakov-Kantorovich type operators which reproduce functions 1 and e^{-x}. We obtain uniform convergence results by means of the modulus of continuity and establish quantative asymptotic formula for new modified operators.

Keyword(s): Baskakov-Kantorovich Operators, King type operators, weighted approximation.

Split Type Octonions Matrix

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In this study, we firstly introduce split type octonion matrices. Afterwards, the main features of split type octonion matrix concept are given by using properties of real quaternion matrices. Then, 8nx8n real matrix representations of split type octonion matrices are shown and some algebraic structures are examined. Additionally, we introduce real quaternion adjoint matrices of split type octonion matrices. Moreover, necessary and suffcient conditions and definitions are given for split type octonion matrices to be special split type octonion matrices. We describe some special split type octonion matrices. Finally, oct-determinant of split type octonion matrices is defined. We also give Cayley Hamilton theorem for split type octonion matrices. Definitive and understandable examples of all definitions, theorems and conclusions were given for a better understanding of all these concepts.

Keywords: Split type octonion matrix, Special matrix, Oct-determinant, Adjoint matrix.

Split Type Octonions and Operations on Representations of Matrices Whose Inputsare Real Quaternions and Complex Numbers.

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In this study, we firstly introduce split type octonions.By using split octonions and countercomplexoctonions,we give the detailed information about the split type octonions.To make some definitions, we describe some operations on the split type octonions. We also show that every split type octonions can be represented by 2×2 real quaternion matrix and 4×4 complex number matrix.In addition, explanatory examples are solved throughout the study.

Keywords: Real quaternions, complex numbers, Matrix representation, Split type octonions.

3-types of Simplicial Group

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In this work, by writing the hypercrossed complex of trisimplicial groups, we prove an equivalence of categories between trisimplicial groups and crossed 3-cubes.

Keyword(s): Simplicial group,Crossed Module, Crossed 3-cube.

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2-Dimensional Simplicial Group

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We give the close relationship between bisimplicial groups and crossed squares in terms of $F_{\alpha,\beta}$functions in the Moorebicomplex of a bisimplicial group.

Keyword(s): Bisimplicial group,Crossed Module, Crossed Square.

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Fixed point theorems for alfa-psi-K-contractive mappins with rational expressions

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In this talk, using alfa-psi-K-contraction, we study the existence of fixed points for contractive mappings using rational expressions on partial metric space, which enable us to extend some results in the literature. In the end we consider illustrative example.

Keyword(s): partial metric space, comparison function, alfa-admissible mapping

Trigonometric B-spline Collocation and Galerkin methods for Time Fractional Burgers' Equation

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Numerical solutions of the time fractional Burgers' equation is presented by using both collocation and Galerkin methods. Trigonometric B-splines are used to set up the approximation functions for the numerical techniques. Comparison of the results of two techniques is given on the solution of the time fractional Burgers' equation. In addition, effects of the trigonometric B-splines on collocation and Galerkin method are shown by studying some test problems.

Keyword(s): time fractional Burgers' equation, collocation method, Galerkin method, trigonometric B-spline.

Study on Time Fractional Korteweg-de Vries Equation via Subdomain Galerkin Method

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A subdomain Galerkin method is set up to find the solutions of the time fractional Korteweg-de Vries (KdV) equation. Trial functions of the Galerkin method consist of the combination of the trigonometric cubic B-splines. Time fractional test problems are studied to show efficiency of the suggested method. Suggested algorithm is written by using Matlabprogramme language.

Keyword(s): Subdomain Galerkin method, time fractional Korteweg-de Vries equation, trigonometric cubic B-splines.

A Method for Image Encryption Based on Displacement Algorithm

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In today's world, ensuring data security in communication is one of the important issues. Encryption is one of the ways to ensure security of the data. The encryption of the data makes it unreadable by unauthorized people. In this study, to encrypt an imagea displacement algorithm is used.

Kyword(s): Image Encryption, RGB, Displacement Algorithm

A New Family and its Coding/Decoding Algorithm

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GeneralizedFibonaccinumbersandrelatedrecursiveconstructsplaysignificant role in codingtheory. Inthisstudy, a newfamily of GeneralizedFibonaccinumbersis introduced. Afterfindingtherelationsamongthismatrixelements, a newcodingtheorybasedthisfamily is established.

Kyword(s): Coding/decoding algorithm, Generalized Fibonacci numbers

A New Algorithm for Coding Theories

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Generalized Fibonacci numbers and related recursive constructs play an significant role in coding theory. In this study, we have developed an algorithm that allows us faster processing in the error detection and correction for Generalized Fibonacci numbers. This algorithm provide not only integer solutions as desired but also makes it possible that these solutions satisfying the "checking relations" are choosed.

Kyword(s): Coding/decoding algorithm

Maximal Formally Normal Differential Operators for First Order

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In this work, the general form of all maximal formally normal extensionsof the minimal operatorgenerated by differential-operator expression for first order in the weighted Hilbert spaces of vector-functions on right semi-axis in terms of boundary conditions has been found. Furthermore, structure of spectrum of these extensions was investigated.

Keywords: Maximal formally normal operator, Differential operator, Spectrum.
2010 AMS Classification: 47A10, 47B25

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Singular Numbers of Lower Triangular One-Band Block Operator Matrices

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In this work the compactness of lower triangular one-band block operator matrices in the infinite direct sum of Hilbert spaces has been studied. And also belonging to Schatten-von Neumann classes this type operators it will be investigated.

Keywords: Direct sum of Hilbert spaces, Lower triangular one-band block operator matrix, Compact operator,
Schatten-von Neumann classes.
2010 AMS Classification:47A10, 47B10, 47B37.

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Power series method for double sequences of positive linear operators and Korovkin-type theorem

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In the present work, we prove a Korovkin type theorem for double sequences of real valued functions defined on a compact subset of the real two-dimensional space by using power series method. Also, we construct a strong example that satisfies our theorem. Finally, we compute the rate of convergence.

Keyword(s): The double sequences, Power series methods , Korovkin theorem,

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A Korovkin-Type Approximation Theorem via Statistical Relatively Equal Convergence

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In this paper, we introduce new type of statistical convergence by using the notion of the relatively uniform convergence. With the help of this new convergence, we prove a Korovkin-type theorem. After then, we give an illustrative example in support of our theory. Finally, we calculate the rate of convergence.

Keyword(s): Statistical convergence, Korovkin-type Theorem, statistical relatively uniform convergence,

A New Class of Operator Ideals , $L_{u,v,E}$

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In this paper, a new class of operators by using block sequence space $l_p(E)$ is defined. Also it is shown that under some conditions this class is a quasi-Banach operator ideal with appropriate quasi-norm.

Keywords: Operator ideals, Block sequence spaces

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Properties of $\boldsymbol{L_{p,E}}$ and $\boldsymbol{L_{\emptyset(p),E}}$ Operator Ideals

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In this paper, the properties of the class of s-type $l_p(E)$ operators are studied. Also by the help of other s-number examples, new classes are defined and the relations between these classes are given. Then, the properties of the operator ideal $\boldsymbol{L_{\emptyset(p),E}}$ are studied. Also different classes defined by using other s-number examples and the relations between these classes are given.

Keywords: Operator ideals, Block sequence spaces

A Family of Sobolev Orthogonal Polynomials on the Triangle

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In this study, a family of orthogonal polynomials on the triangle is considered and some recurrence relations are obtained for these polynomials. In the view of these recurrence relations, for some negative cases of the parameter α, β and γ in the polynomial, the orthogonality of the polynomials with respect to Sobolev inner product, which includes derivative, is discussed.

Keyword(s): Sobolev orthogonal polynomials, triangle, partial differential operators

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Generalized Durrmeyer type operators on a simplex

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We consider a family of Durrmeyer type operators on a simplex, depending on a parameter, which give a link between the genuine Durrmeyer operators on a simplex and the Bernstein operators on a simplex. Certain approximation properties of these operators are studied.

Keyword(s): Linear positive operators on a simplex, Durrmeyer type operators, Degree of approximation

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Construction of the Algebraic Preconditioning using Riesz map and its Numerical Application

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The aim of this work is to present some numerical results related to Josef Malek and Zdenek Strakos's work[1], using FEM. The purpose of their paper was linking PDE's analysis, functional analysis, and calculus of variations with matrix iterative computation, using Krylov subspace methods [2]. The preconditioning of the conjugate gradient method, is often developed algebraically using the preconditioned finite-dimensional algebraic system, but according to Josef Malek and Zdenek Strakos, the preconditioning is connected to the PDE's analysis, and the infinite-dimensional formulation of the conjugate gradient method, thanks to Riesz map. The discretization and preconditioning of PDE are linked together.

Keyword(s): Preconditioning, Conjugate Gradient method, PDE,Krylov methods.

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An investigation of Teachers' Qualifications of Designing Interdisciplinary Mathematical Modeling Activities

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Mathematical modeling can be seen as a bridge to STEM education (English, 2015). From this perspective, interdisciplinary mathematical modeling (IMM), which can be expressed similar ideas as the understanding of mathematical modeling that deals with different disciplines together. It is very important to integrate IMM activities that enhance problem-solving skills by providing the opportunity to combine different disciplines in the instructional program and use it in practice in order to support the development of learning at the conceptual level. For this purpose, it is necessary to increase teachers' awareness and skills of IMM activities. Ferri (2018) stated that teachers should have some competencies for effective modeling teaching, and they have dealt with the qualifications in four different dimensions as theoretical, activity, practice and diagnosis. In this study, the competencies of the teachers in the aspect of activity were discussed with regard to task design.

This study, which addresses IMM in the context of science and mathematics disciplines, was conducted by 9 mathematics and 9 science teachers. All teachers participated in a three-month workshop training in which the theoretical knowledge on IMM and mathematical modeling was presented. At the end of the training, the teachers were asked to develop IMM activities in groups of two, one being science and the other being mathematics.

The results showed that, at the beginning of the workshop, teachers associate science concepts such as force-motion, pressure, simple machines, which are required mathematical computation with mathematics. Yet, when they were asked to design an IMM activity at the end of the workshop, they mainly associate mathematics and science disciplines in biology-related concepts such as environmental problems, renewable energy sources, conscious consumption, recycling. The science curriculum focuses on teaching the science concepts without entering the mathematical competition, which may be the reason why teachers prefer more biology-related concepts while designing the activities. Other reason might be the nature of IMM which focuses on real-world activities in association with mathematics and science. The aspects that teachers paid attention to when designing their activities included a real-life scenario that might be meaningful for the students with a strong story to encourage them to solve the problem. The emergence of different models or solutions in IMM activities was another important criterion that teachers consider when designing their activities. While considering teachers' limited conceptions of IMM at the beginning of the study, their progress of understanding and designing IMM activities were impressive and valuable. Thus, proving teachers this kind of training programs are important for teachers development.

Keyword (s): Interdisciplinary Mathematical Modeling, Mathematical Modeling,TeacherCompetencies, Activity Dimension

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STEM from Social Sciences Perspective: Mathematics-Turkish Interdisciplinary Model Eliciting Activity

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STEM education is an educational approach designed to meet the need for educating creative individuals who systematically think in science, technology, engineering and mathematics, giving them a critical perspective, and transferring their learnings to new and different problems. STEM education is a constantly evolving field, and many different views have been raised in this area. According to some researchers, "Engineering" in the STEM section means "engineering" as well as "design and production". The letter "S" describing the word "science" includes not only natural sciences but also humanities and social sciences. The letter "E" is considered as design and production and "S" as social sciences.

The aim of the study is to see to what level students learn some concepts related to mathematics and social sciences together. For this purpose, the researchers worked together with the teachers of Mathematics and Turkish to develop the "Reading Problem" which is an activity to create interdisciplinary model. Before this problem was solved, the students worked on modeling problems for 4 weeks with collaborative learning approach and produced explanations, representations, mathematical forms, diagrams and mathematical models from the solutions of these problems. The Reading Problem includes learning areas of both mathematics and Turkish disciplines. This problem has been applied to 7th grade students in groups of 3-4 studying in a city center in the eastern region of Turkey. In the interdisciplinary problem-solving process, students have learned some concepts related to Turkish and developed a mathematical model.

Keywords: Model Development Process, Interdisciplinary Model Building Activity, Interdisciplinary Problem Solving

Stress Distribution Caused by Local Curving of Layers in an Infinite Elastic Body under Bi-axial Compression

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In the present work, the stress distribution in an infinite elastic body,reinforced by an arbitrary number of non-intersecting co-phase locallyspatiallycurved filler layersunderbi-axial compressionis considered. It is assumed that this system is loaded at infinity with uniformly distributed normal forces acting in the direction which is parallel to the layers’ location planes. It is required to determine the self-balanced stresses within, caused by the spatially local curving of the layers. The corresponding boundary and contact value problem is formulated within the scope of geometrically non-linear exact three-dimensional equationsof the theory of elasticity by utilizing of the piece-wise homogeneous body model. The solution to the formulated problem is represented with the series form of the small parameter which characterizes the degree of the aforementioned local curving. The boundary-value problems the zeroth and the first approximations of these series are determined with the use of the exponential double Fourier transform. The original of the sought values is determined numerically.

Consequently, in the present investigation, the effect of the local curving on the considered stress distribution is taken into accountwithin the framework of the geometrically non-linear statement. The numerical results related to the considered stress distribution and to the influence of the problem parameters on this distribution are proposed and discussed.

Keyword(s): Self-balanced Stresses, Spatial Local Curving, Fourier Transform, Non-linear equations

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Entropy of Weighted Tree Structures

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Studies of the information content of complex networks and graphs have been initiated in the late 1950s based on the seminal work due to Shannon. Numerous measures for analyzing complex networks quantitatively have been contributed. A variety of problems in, e.g., discrete mathematics, computer science, information theory, statistics, chemistry, biology, etc., deal with investigating entropies for relational structures. For example, graph entropy measures have been used extensively to characterize the structure of graph based systems in mathematical chemistry, biology and in computer science–related areas. Among the large number of existing indices, an important class of such measures relies on Shannon’s entropy to characterize graphs by determining their structural information content.The Sackin index of a rooted tree is defined as the sum of the depths of its leaves.In this paper, we study the entropy of weighted tree structures with the Sackin index as weights.Exact formulas for the entropy of paths, stars, comets and dendrimers are given.

Keyword(s): Shannon’s entropy, Sackin index,Weighted tree structures.

A Risk-sensitive maximum principle

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Throughout this paper we focused our aim on the problem of optimal control under a risk-sensitive performance functional where the system is given by a fully coupled Forward-Backward Stochastic differential equation with jump. The risk neutral control system is established as extition of the existing results in such problem has been studied as preliminary step, where the admissible controls are convex and optimal solution exists, the sufficient optimality conditions for risk-sensitive performance are proved. At the end of this work we illustrate our main result by giving an example of risk sensitive control problem under linear stochastic dynamics with exponential quadratic cost function.

Key words: Fully Coupled Forward Backward Stochastic Differential Equation with Jump, Risk-sensitive, Necessary Optimality Conditions, Sufficient Optimality Conditions, Optimal control, Logarithmic Transformation.

Intuitionistic Fuzzy Phi-Contractive Mappings and Fixed Point Results With Applications

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Fixed point theorems for a pair of intuitionistic fuzzy mappings under phi-contraction condition on a complete metric space have been established in connection with Hausdorff metrics and d-infinity metrics on the family of intuitionistic fuzzy sets. A non-trivial example is also presented for the illustration of assumptions and validity of our main result. Furthermore, the main theorem is applied to obtain the common solution of a system of Volterra integral equations.

Some Contraction Mappings on Branciari b-Metric Spaces

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In the literature, there are many applications of fixed point theorems which play a crucial role in many fields such as differential equations, mathematical economics, dynamics, functional analysis and operator theory. The best known Banach contraction principle is one of the useful tools in nonlinear analysis. In 1969, Meir-Keeler contractive type condition is established and authors derive fixed point results for mappings satisfying this condition.

In this study, we present a fixed point theorem for some Meir-Keeler type contractions in the setting of Branciari b-metric spaces. We obtain some interesting results.

Keyword(s): Fixed point, Contraction mapping, Branciari b-metric,

Energy of Dynamical Force Fields in Minkowski Space Via Parallel Vectors

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In this study, we firstly define equations of motion based on the traditional Newtonian mechanics in terms of the parallel frame adapted to the worldline of a moving particle in Minkowski space. Then, we compute energy on the timelike moving particle in the resultant force field by using the geometrical description of the curvature and torsion of the wordline belonging to the particle in the space. We also investigate the relation between energy on the timelike moving particle in different force fields and energy on the timelike moving particle in the parallel vector fields.

Keyword(s): Dynamics System, Force fields, Energy, Parallel vector fields.

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Timelike Dynamical Magnetic Curves on 3D Semi-Riemannian Manifolds

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In this study, we investigate a special type of timelike magnetic trajectories associated with a magnetic field B defined on a 3D semi-Riemannian manifold in Minkowski 3-space. Firstly, we consider a moving charged timelike particle, which is assumed to be under the action of a particular external force in the magnetic field B on the 3D semi-Riemannian manifold in Minkowski 3-space. Then, we assume that timelike trajectories of the particle associated with the magnetic field B correspond to a particular timelike dynamical magnetic curve of the magnetic vector field B. Furthermore, we compute energy of each dynamical magnetic curve by considering the least action principle. Then, the radius of gyration and the gyro-frequency of each timelike magnetic trajectory are investigated to comprehend the exact movement of the charged particle in the given uniform magnetic field B. Finally, we give the physical interpretations of the study.

Keyword(s): Magnetic field, Force fields, Timelike dynamical magnetic curve, Energy, Magnetic force.

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An Algorithm of Application of Lie Groups to Family of Differential Equations

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Differential equations, involving some free functions of their variables represent actually, a set of equations with the same structure, which we may call "family of differential equations".Each member of the set may point out the same physical problem for variousdifferent materials in classical physics, whereas in mathematics, they are the different members of the same family of differential equations.

Lie Groups havemany applications to differential equations such as determining solutions, group classification, constructing their invariant quantities etc. Lie Group application to family of differential equations have significant importance not only in the meaning of the ones mentioned above, but also in the meaning of generating maps between the members of the family. When preserving the structure of the family of differential equations, if an appropriate transformation is valid, the transformation group of the family generate maps between equivalent but different members. The idea is based on Ovsiannikov [1] and has been developed by many researchers [2,3] then. One of the recent studies in application to equivalence groups to general two dimensional diffusion equation is given by Özer [4] in details and with many examples.

In this study, we shall give the general perspective to the transformation groups of family of differential equations. An alternative algorithm to determine the group will be developed and examples will be discussed between different types of differential equations.

Keywords: Family of Equations, Transformation Groups, Lie Group Application.

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On the Solution to Nonlinear Wave Type Equations via Lie`s Approach

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The behavior of nonlinear partial differential equations has significant concern in Applied Mathematics and Mathematical Physics as they express many physical problems. Lie group analysis to nonlinear differential equations has many applications. Recently,group classification of differential equations, the invariant solutions of some group of equations and the equivalence groups of differential equations has been examined by many researchers to understand the behavior of the equations and many different approaches have been developed for this purpose. Some interesting studies can be found in the references [1-3].

In this study we consider general representations of some nonlinear wave type equations and investigate their exact solutions via Lie Groups The method depends on generating appropriate transformation groups between various types of different equations each can be expressed as a member of the same family of equations. We show the necessary conditions to be able obtain transformations between linear and nonlinear wave type equations, so that the exact solutions can be written for nonlinear equations via the linear ones. In the present work, some class of nonlinear equations aredetermined which are equivalent to the simple constant coefficient wave equation. Thus exact solutions to nonlinear wave equations are givenvia the transformation groups.

Keywords: Nonlinear Wave Equation, Transformation Groups, Exact Solution, Lie Group Application to Differential Equations.

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Coeffcient estimates for two general subclasses of *m*-fold symmetric Bi-univalent functions

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In the present paper, we introduce some new subclasses of $\sum_m$ consisting of analytic and *m*-foldsymmetric bi-univalent functions in the open unit disk U. Moreover, for functions belonging to the classes introduced here, we derive non-sharp estimates on the initial coefficients $|a_{m+1}|$ and $|a_{2m+1}|$.

Keyword(s): Coefficient estimates, m-fold symmetric bi-univalent functions, Starlike functions

Chebyshev Polynomial Coeffcient Bounds for an Unified Subclass of Bi-univalent Functions

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The aim of this paper to discuss a newly constructed subclass of bi-univalent functions. Furthermore, we establish Chebyshev polynomial bounds for the coefficients and Fekete-Szegö inequalities for the class $S_{\Sigma}(\mu,\lambda)$.

Keyword(s): Coefficient bounds, Bi-univalent functions, Chebyshev polinomials,Fekete-Szegöinequality

A modified chi-square test for repairable system of Bertholon model

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In reliability and survival analysis, the competing risks models are widely used. Recently, simple models which can describe various competing risks of death or failure in lifetime data analysis were investigated such as the distribution of Bertholon (Bertholon et al., 2004).Chi-squared goodness-of-fit tests are the most used for checking the validity of statistical models in the statistical literature. Nevertheless, the conditions of their application are not almost verified, particularly when models are not completely defined and parameters are unknown.

In this work, we propose the construction of modified chi-square type test for a competing risks model introduced by Bertholon, and which can describe early failures and aging as well. This test used for complete data for a repairable system is based on the NRR (Nikulin-Rao-Robson) statistic which has a chi-square distribution.This test is based on the maximum likelihood estimation for initial data, and follows a chi-square distribution. Numerical examples from simulated samples and real data are given to illustrate the potentiality of the proposed test.

Keyword(s): Bertholon model, EM algorithm, Fisher information, NRR test, Maximum likelihood estimation,

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High-Order Finite Difference Method for Delay Pseudo-Parabolic Equations

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In this work, one dimensional initial-boundary delay pseudo-parabolic problem is being considered. We solve this problem numerically. We construct higher order difference method for approximation to the considered problem and obtain the error estimate for its solution. Based on the method of energy estimate the fully discrete scheme is shown to be convergent of order four in space and of order two in time. Numerical example is presented.

Keyword(s): Pseudo-parabolic equation, Delay difference scheme, Error estimate

Numerical Solution of Soybean Hydration Model with Variable Diffusivity

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Many physical problems arising in engineering and science include volume variation or movement of system boundaries. Since these problems are time-dependent problems, they are modeled by the parabolic partial differential with an initial condition and two boundary conditions, are class of initial-boundary value problems. Boundary conditions are adopted for the center and the surface of the material. In these problems, an additional condition can be adopted for movement of the moving boundary is determined as part of the solution. These problems are described as Stefan Problem.

In this study, numerical solutions of soybean hydration model with variable diffusivity which are modeled by Stefan problem are investigated. Fourth and sixth compact finitedifference method combined with Variable Space Grid method is used for spatial discretization. The results are compared with results with regards to computational effort and accuracy in the literature.

Keyword(s): Stefan problem, hydration model.

Analyzing of SIR Models of Tuberculosis in Turkey

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This work is aimed to describe the Susceptible- Infected Recovered (SIR) epidemic models to explore the transmission of tuberculosis (TB) in Turkey. The models are fitted to reported data of infected population over time by least squares method and obtained parameters of the model which used in calculating the reproduction numberR_0. In order to demonstrate theaccuracy of parameters, numerical experiments have been performed and it is shown that obtained result and reported data are in good agreement.

Keyword(s): Epidemic model, tuberculosis, basic reproduction number.

Approximation process by generalized integral Favard-Szász operators involving Sheffer polynomials

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This article deals with the approximation properties of a generalization of an integral type operator, in the sense of Favard-Szász type operators including Sheffer polynomials. We investigate the order of convergence, in terms of the first and these condorder modulus of continuity, Peetre's K-functional and give theorems on convergence in weighted spaces of functions by means of weighted Korovkin type theorem. Finally, we present some numerical examples.

Keyword(s): Integral operators;Favard-Szász operators; modulus of continuity; Appell polynomials; Peetre's K-functional, Sheffer polynomials.

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Improvement of the Efficiency for Quantum Sensors Based on Trapped Single Qubitsvia the Dynamical Control Feedback Algorithms

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In the years 2017-2018 we observe a distinct progress in different engineering applications of quantum systems trapped by the specific shapes of potentials and interacting with static impurities. Such systems are used for the purpose of quantum computation, quantum simulations of many-body physics and for development of precise quantum analyzers and sensors.

The extreme sensitivity of quantum systems towards the external perturbations and in the same time their ability to be strongly coupled to the measured target field makes them to be stable under the environmental noise. A high quality quantum sensor can be engineered even on the platform of a single trapped qubit.

There is a variety ofoptimal and sub-optimal algorithms for effectivecontrol over the quantum system states. Particularly, we have to mention our recent research on the dynamical manipulation over qubits via speed gradient and target attractor ‘synergetic’ feedback that has been finalized in the concept of dynamical quantum gates (operators).

Here we discuss the opportunity to improve the efficiency of the external field quantum sensor based on a trapped single qubitvia itsfeedback tracking. We compare few alternative control approaches and discuss pros and cons foreach of them.

Our algorithmic approach could be realized experimentally in a set of physical systems, like nitrogen vacancy centers in diamonds, ultracold atoms in magnetic fields and others.

Keywords: Trapped qubit, quantum control algorithms, quantum sensors.

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Alternative Algorithms for Detecting and Controlling Pre-Ictal and Ictal Phases of Epileptiform Regime in Small Hodgkin-Huxley Neural Clusters

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The exact mechanisms for the appearance and developing of the temporal over-synchronized epileptic behavior in the biological neural networks still is a subject of many discussions. According to the Critical Brain Hypothesis, the dynamics of certain biological neurons in the brain networks stay closed to the regimes of phase transitions. The epileptic dynamics maybe originated in the transition from a subcritical quiescent phase to a supercritical active phase.Switching to epilepsy depends also on many external factors, like neurovascular and metabolic processes surrounding a seizure focus.

There is a variety of mathematical methods for effective detecting pre-ictal and ictal phases, among them are: studying the statistics of time intervals between spikes, measuring the fluctuations of firing rate, defining the characteristic signal patterns, measuring the degree of synchrony between the channels via phase or amplitude lock values.

Here we study small clusters of Hodgkin-Huxley (HH) neurons. Following experimental data, such HH populations are designed as a small-world network with directed links. The network contains one neuron detecting and controlling pre-ictal and ictal phases of epileptiform regime in the HH population.

The first version of the detecting algorithm is based on the evaluation of the Ma-Tang statistical R-factor of synchronization defined for the cluster of HH neurons via their relative membrane potentials.

The second approach fits the HH neural directed small world network with the statistical dynamics closed to the critical behavior. Two different phases of the model correspond to the regular and epileptiform seize regimes. The pre-ictal dynamics fit the phase transition between two phases. Thus, the pre-ictal phase can be naturally described in the terms of the phase transition in the given statistical model.

We compare the efficiencies of two alternative detecting algorithms and discuss the possible mechanisms of epilepsy that appears in the real biological neural networks.

Keywords: Hodgkin-Huxley Mathematical Neuron, Epileptiform Non-Linear Dynamics

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On the properties of fractional difference operators

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In this poster, we will show some results about the monotonicity and convexity properties of discrete fractional operators.

Keyword(s): Fractional difference operator, monotonicity, convexity

Fractional order inequalities for synchronous functions

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Theory of fractional calculusis an attractive branch of mathematics, since it has many applications in the different disciplines of science. Although, it has a long history as ordinary derivative and integral, most notably definitions about fractional calculus are introduced in the 20th century, Riemann-Liouville, Caputo, Grünwald-Letnikov, etc, see [1,2]. In the last decades, parallel with the continuous case, fractional calculus is studied in discrete case, see [3].

In this talk, we will present inequalities for synchronous using fractional derivative and difference operators.

Keywords: Fractional Calculus, Inequalities, Chebyshev's inequality.

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Space-Time Characteristics of Seismicity in Gümüşhane, Turkey: An Application of the Most Frequently Used Statistical Models

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The main purpose of this study is to make a detailed space-time analysis of earthquake activity in Gümüşhane, Turkey, at the beginning of 2018. For this purpose, we preferred the most frequently used statistical models for the evaluation of earthquake potential. In this context, a statistical assessment of the regional and temporal variations of the main seismicity parameters such as completeness magnitude *Mc*-value, seismotectonic*b*-value, standard normal deviate *Z*-test called seismic quiescence and *GENAS* algorithm to estimate all important rate changes of earthquake activity in differentmagnitude thresholds are achieved. For the detailed analyses, the region between the co-ordinates 39.5ºN and 41.0ºN in latitude and the co-ordinates 38.5ºE and 40.5ºE in longitudewas selected as the study area. Earthquake catalog are compiled from the Boğazici University, Kandilli Observatory and Earthquake Research Institute (KOERI).This catalogincludes about 47.27-years period from September 21, 1970 to December 27, 2017. It is homogeneous for duration magnitude, M_d, and consists of 2802 shallow earthquakes having magnitudes greater than or equal to 1.0. Magnitude levels generally vary from 2.5 to 3.5 and, the earthquake magnitudes reach a maximum in M_d=2.8. The variation of *Mc*-value in time also shows a distribution between 2.5 and 3.0 after the year of 2000. So, average completeness magnitude for the region was taken as *Mc*=2.8. Temporal changes of *b*-value show that there is not anyimportant decrease in recent years although some significant decreases in *b*-value before some strong earthquakes in the region between 1970 and 2018 are observed. Regional variations of *b*-value indicate that small *b*-values observed in and around Kelkit and Köse covering the north of Köse and the south of Kelkitmay be significant in terms of the possible earthquake potential. The analysis of seismic quiescence *Z*-value shows that no anomalies of significant rate changes in the earthquake activity is detected in the study region at the beginning of 2018. To separate the magnitude bands where significant variations occur, the magnitude levels were separately evaluated by *GENAS* test. With this technique, important changes in the number of the larger and smaller earthquakes than a given magnitude versus time are described. The results show that a strong decrease is observed for both small and large earthquakes at the beginning of 2018. There is a remarkable compatibility between the results of seismic quiescence and the *GENAS*results. According to these results, the earthquake hazard is low and earthquake risk is minor in Gümüşhane province of Turkey.Consequently, these types of statistical assessments of space-time characteristics may supply important clues for the intermediate term earthquake potential.

Keywords: Gümüşhane, Seismicity, Z-value, GENAS, Earthquake Potential

Size-Scaling Distributions ofEarthquake Occurrences in Gümüşhane, Turkey: Magnitude Variations, Seismotectonic*b*-value and Fractal Dimension *Dc*-value

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In the scope of this study, a detailed statistical analysis of size-scaling distributions of earthquake occurrences in Gümüşhane, Turkey, at the beginning of 2018 was performed by evaluating the most frequently used size-scaling parameters such as completeness magnitude, *Mc*-value, described as the minimum magnitude of complete reporting, seismotectonic*b*-value, a power-law of size distribution of earthquakes, fractal dimension *Dc*-value, describing the size scaling attributes and clustering properties of earthquakes, annual probabilities and recurrence times of earthquakesas well as the magnitude distribution of earthquake activity. Statistical analyses were carried out in a rectangular area covered by the co-ordinates 39.5ºN and 41.0ºN in latitude and the co-ordinates 38.5ºE and 40.5ºE in longitude. Earthquake database is taken from Boğazici University, Kandilli Observatory and Earthquake Research Institute (KOERI). This catalog is homogeneous for duration magnitude, M_d, and includes 2802 shallow earthquakes having magnitude equal to and larger than 1.0 in about 47.27-years period between September 21, 1970 and December 27, 2017. The cumulative number of earthquakes against time show that any significant changes are not reported in seismicity from 1970 to 2003. However, the number of earthquakes gradually increases after 2003 and significant fluctuations in the earthquake activity are reported especially after the 2005s. Time-series analyses show that there are slight increases in the number of earthquakes in 2003 and 2017 and, there is a maximum increase in the number of events in 2012. The numbers of earthquakes show an exponential decay rate from the smaller to larger magnitudes and magnitude levels are change between 2.5 and 3.5 on average. Hence, the completeness magnitude for Gümüşhane region is taken as *Mc*=2.8.By using this *Mc*-value, *b*-value is calculated as 1.01±0.02 with the maximum likelihood method. This result show that magnitude-frequency distribution of earthquakes in Gümüşhane is well represented with a *b*-valuetypically close to 1.0.By using 95% confidence interval and linear curve fitting technique, *Dc*-value is estimated as 1.57+0.03. For this distribution, the scale invariance in the cumulative statistics are selected between 5.11 and 89.01 km. This *Dc*-value indicates that seismic activity in Gümüşhane is more clustered at larger scales or in smaller areas. Analyses on annual probabilities of earthquake occurrences show that magnitude levels between 4.5 and 6.5 exhibits a value smaller than 1.0. Recurrence time of the earthquakes has a value of 30 years for M_d=5.5 and 100 years for M_d=6.0. These results reveal that Gümüşhane has not a noticeableearthquake potential for strong earthquake occurrences in the intermediate term.

Keywords: Gümüşhane, *b*-value, *Dc*-value, Annual Probability, Recurrence Time

Uniform Convergence of Spectral Expansions for Continuous Functions for A Problem with a Eigenparameter in the Boundary Condition

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Solutions that obtained by using the Fourier method of partialdifferentialequations are represented by a series. Therefore, the investigationof the convergence of these series is of great importance. The presentation is about the investigation of the uniform convergenceproperties of the series expansions in terms of eigenfunctions for the boundary value problem

$$-y'' = \lambda y,\ \ 0 < x < 1,$$
$$y(0) = 0,\ \ y'(0) = \lambda\left(ay(1) + by'(1)\right),$$

where λ is a spectral parameter, a and b are arbitrary reel numbers which satisfy the condition $|a| + |b| \neq 0$.Before it is investigated, we studied that the system of eigenfunctions of the corresponding operator, with an arbitrary eigenfunction removed, form a basis in the space $L_2(0,1)$. To see this, we proved that the system of eigenfunctions is quadratically close to corresponding sine or cosine systems which are orthonormal bases in $L_2(0,1)$.

Keyword(s): Eigenvalues, Eigenfunctions, Uniform Convergence of Spectral Expansion

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Abstract Korovkin Theory for Double Sequences via Power Series Method in Modular Spaces

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In the present paper, we obtain an abstract version of the Korovkin type approximation theorems for double sequences of positive linear operators on modular spaces in the sense of power series method. We present an example that satisfies our theorem but not satisfies the classical one and also, we study an extension to non-positive operators.

Keyword(s): Abstract Korovkin theory, double sequences, power series method

Korovkin Type Approximation Theorem via K_a-Convergence on Weighted Spaces

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Lazic and Jovovic defined the K_a-convergence in 1993 (Univ. Beograd. Publ. Elektrothen FAK. 4, 81–87). More recently, Orhan and Demirci give a Korovkin type theorem via this interesting convergence method (Period. Math. Hungar. DOI 10.1007/s10998-017-0225-9). In this paper, we study the Korovkin type approximation theorem for K_a-convergence on weighted spaces. We also study the rate of K_a-convergence by using the weighted modulus of continuity and afterwards, we present a non-trivial application.

Keyword(s): K_a-convergence, Korovkin theorem, weighted spaces.

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On Some Convergence Properties by n-dimensional Integral Operators with Radial Kernel

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In this study, we present a review on some approximation results of n-dimensional integral operators with radial kernels. We will show that the point wise convergence of singular integral operators at characteristics points in the$L_1(R^n)$

Keyword(s):,n-dimensional integral operators ,Rradial kernels, , Pointwise convergence.

On Pointwise Convergence of the Family of Urysohn Type Integral Operator

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In this study, we prove approximation theorems concerning pointwise convergence for the family of Urysohn type integral operators at Lebesque points of bounded function u∈L(-∞.∞), where $K_{\div}$(x,t,u) is an entire analytic function of variable

Keyword(s): Nonlinear integral operators, Urysohn kernel, Gammerstein kernel, Lebesque points, Natanson lemma, majorant kernels.

On The New Semi-Normed Sequence Space

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The purpose of the this study is to introduce the sequence space

$$\ell_p\left(B(r,s),E\right)=\left\{x=(x_n)\in\omega:\sum_{n=1}^{\infty}\left|r\cdot x_{\min E_n}+s\cdot x_{\min E_{n+1}}\right|^p<\infty\right\},$$

where $E=(E_n)$ is a partition of finite subsets of the positive integers, $r,s\in\mathbb{R}/\{0\}$ and $p\geq 1$. The topological and algebrical properties of this space are examined. Furthermore, some inclusion relations are given. Finally, we show that the operator A defined from ℓ_p into $\ell_p\left(B(r,s),E\right)$ is bounded and also we compute the norm of the operator A.

Keywords: Block sequence spaces, matrix domain, operator norm.

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Approximation to Functions of the Classes $\bar{\psi}-$integrals by Generalized Zygmund Sums

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Let L denotethespace of integrable $2\pi-$ periodicfunctions $f \in L$, andlet $S[f] = \frac{a_0}{2} + \sum_{k=1}^{\infty}(a_k \cos kx + b_k \sin kx) \equiv \sum_{k=0}^{\infty} A_k(f;x)$ be theFourierseries of a function f . Further, let $\bar{\psi} = (\psi_1, \psi_2)$ be a pair of arbitraryfixedsystems of numbers $\psi_1(k)$ and $\psi_2(k)$, $k = 1, 2, \ldots$ .Considerthefollowingseries:

$$A_0 + \sum_{k=1}^{\infty}(\psi_1(k)A_k(f;x) + \psi_2(k)\tilde{A}_k(f;x)), \tag{1}$$

where A_0 is thecertainnumberand $\tilde{A}_k(f;x) = a_k \sin kx - b_k \cos kx$. Ifseries (1), for a givenfunction $f(.)$ and a pair $\bar{\psi}$, is theFourierseries of a certainfunction $F \in L$, thenwe say that F is the integral of thefunction f generatedbythepair $\bar{\psi}$, orsimply, the $\bar{\psi}-$integral of thefunction f , anddenotethis as follows: $F(.) = \mathfrak{I}^{\bar{\psi}}(f;.)$.

In this working, we consider theap proximation to functions from the classes of $\bar{\psi}-$integrals by the generalized Zygmund sums in the uniform metric. Inparticularly, we obtain asymptotic equalities for the value $\varepsilon_n(C_{\infty}^{\bar{\psi}}, Z_n^{\varphi})_C = \sup_{f \in C_{\infty}^{\bar{\psi}}} \left\| f(.) - Z_n^{\varphi}(f;.) \right\|_C$, under various conditions on functions $\psi_1(.)$ and $\psi_2(.)$, where $C_{\infty}^{\bar{\psi}} = \left\{ f : f \in C^{\bar{\psi}},\ f^{\bar{\psi}} \in S_M^0 \right\}$, and S_M^0 is the unit sphere in the space M^0 of functions essentially bounded and ortogonal to a constant. Here, $Z_n^{\varphi}(f;x) = \frac{a_0}{2} + \sum_{k=1}^{n-1}\left(1 - \frac{\varphi(k)}{\varphi(n)}\right)(a_k \cos kx + b_k \sin kx)$, $n \in \mathbb{N}$, are generalized Zygmund sums with respect to the Fourier series of f ,where $\varphi(k)$ are the values of a certain function $\varphi \in F$ at integer points, and F is the set of all continuous functions $\varphi(u)$ monotonically increasing to infinity on $[1, \infty)$.

Keyword(s): Generalized Zygmund sums, $\bar{\psi}-$integrals, Fourier series, trigonometric approximation

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Refined descriptive sampling with dependent variables

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In this paper, we propose an algorithm to generate refined descriptive samples [3] from dependent random variables for estimation of expectations of functions of output variables using the Iman and Conover algorithm [2] to transform the dependent variables to independent ones. Hence, the asymptotic variance of such an estimate in case of dependent input random variables is proved, using a result from [1], to be less than that obtained using simple random sampling.

Keywords:
Simulation, Monte Carlo Methods, Sampling Theory, Variance Reduction

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Some Fixed Point Theorems for Kannan Type Mappings by Using Rectangular Soft Metric

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The aim of this work is to investigate and to present the proof of some fixed point theorems for Kannan Type Mappings by using rectangular soft metric. At First,the properties of rectangular soft metric spaces and Banach Contraction Theorem for rectangular soft metric spaces are reminded. Next, some fixed point results are obtained by using Kannan Type Mappings in rectangular soft metric spaces.

Keyword(s): Soft Meric, Kannan Type Mapping, Fixed Point

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On Soft Fibrations in Digital Images

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In this paper the homotopy lifting property for soft sets in digital images is determined by using soft homotopy for digital images. The soft fibration is defined in digital images due to homotopy lifting property and then some properties of soft fibrations are obtained in digital images.

Keyword(s): Digital Image, Soft Set, Soft Fibration.

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Leader-following consensus for Caputo fractional multi-agent systems

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A leader-following consensus of Caputo fractional multi-agent systemswith nonlinear intrinsic dynamics is investigated. The direct Lyapunov method is used to study the leader-following consensus in the general case of non-Lipshitz function describing the intrinsic nonlinear dynamics and time dependent coefficients in the control protocol. In this paper we give a brief overview of the most popular fractional order derivatives of Lyapunov functions and these derivatives are applied to various types of neural networks to illustrate their advantages/disadvantages. We show the quadratic Lyapunov functions and Lyapunov functions which do not depend directly on the time variable and their Caputo fractional derivatives are not applicable in some cases when one studies stability properties. Some sufficient conditions using time dependent Lyapunov functions are obtained and illustrated on some particular Caputo fractional multi-agent systemswith nonlinear intrinsic dynamics.

Keyword(s): consensus, leader-following problem, nonlinear Caputo fractional systems, Lyapunov functions, stability, fractional derivative of Lyapunov functions.
Acknowledgement: Research was partially supported by the Fund NPD, Universityof Plovdiv "PaisiiHilendarski", No. MU17-FMI-007.

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Razumikhin method to delay differential equations with non-instantaneous impulses

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The stability for delay differentialequations with non-instantaneousimpulses is studied using Lyapunov like functions and the Razumikhin technique. In thesedifferential equations we have impulses, which start abruptly at somepoints and their action continue on given finite intervals.Sufficient conditions are given and they use comparison results for nonlinear scalar non-instantaneous impulsive equation without any delay. Examples are given to illustrate our stability properties and the influence of non-instantaneous impulses on the behavior of the solution.

Keyword(s): non-instantaneous impulses, stability, Razumikhin technique, Lyapunov functions

Acknowledgement: Research was partially supported by the Fund NPD, Universityof Plovdiv "PaisiiHilendarski", No. MU17-FMI-007.

Fixed Point Property for Intuitionistic Fuzzy Chain Complete Poset

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In a recent paper, Milles et al. introduced the notion of intuitionistic fuzzy complete lattice and proved the fixed point property for intuitionistic fuzzy lattice. In this paper, we extend this study by considering the class of intuitionistic fuzzy chain complete ordered set and the Tarski and Abian-Brown fixed point theorems for intuitionistic fuzzy chain complete are proved.

Keyword(s): Atanassov's intuitionistic fuzzy set, Chain complete, Fixed point property.

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Intuitionistic Fuzzy Down-Sets and Up-Sets on a Lattice

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In a recent paper, Milles et al. have characterized the notions of intuitionistic fuzzy ideal and filter on a lattice in terms of the lattice meet and join operations. In this paper, based on these characterization theorems, we introduce the notion of intuitionistic fuzzy down-set (resp. the intuitionistic fuzzy up-set) on a lattice analogously to the crisp down-set (resp. up-set), and their interesting properties are given.

Keyword(s): Intuitionistic fuzzy set, Down-set, Up-set.

New result concerning a problem of frictionless contact with adhesion and damage

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In this paper, we deal with a dynamic frictionless contact problem with adhesion and damage. The contact is modeled with normal compliance condition. The adhesion of the contact surfaces is considered and modeled with a surface variable, the bonding field, whose evolution is described by a first order differential equation. We establish a variational formulation for the problem and prove the existence and uniqueness of the solution. The proofs are based on the theory of evolution equations with monotone operators, fixed point arguments and classical existence and uniqueness result for parabolic inequalities.

Keyword(s): Dynamic process, Viscoelastic material with damage, weak solution, Ordinary differential equation, fixed point, weak solution.

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Comparison of kernel functions in arrhythmia classification

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Arrhythmia is one of the most common heart diseases in the world. Due to the complex nature of electrocardiogram, the hand-operated diagnosis of arrhythmia is very tedious. In this article, a multi-class support vector machine (MSVM) based approach is proposed to solve ECG multi-classification problem. To do so, several features besides RR interval are used. Various kernel functions in themulti-class support vector machineare tested for arrhythmia classification. Performance evaluation for the proposed method was tested over the MIT-BIH Arrhythmia Database.

Keyword(s): ECG, Multi-class support vector machine,Arrhythmia classification.

Existence and Multiplicity of Positive Solutions for Four Point Fractional Boundary Value Problems

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In this work, by introducing a new operator, improving and generating a p-Laplace operator for some $p > 1$, using Krasnosel’skii’s and Leggett-Williams fixed point theorems we discuss the existence and multiplicity of positive solutions to the four point boundary value problems of nonlinear fractional differential equations. Our results extend some recent works in the literature.

Keywords: Fractional differential equations, Boundary Value Problems, Positive solutions.

On the Solutions with Kerr Law and Power Law Nonlinearity

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This work studies solitary wave solutions of some evolution equations with Kerr law and power law nonlinearity. The extended method strategy applied to extract the traveling wave solutions. Our results extend some recent works in the literature.

Keyword(s): Evolution equations, Kerr law nonlinearity, Power Law nonlinearity,
Acknowledgement: This research is supported by Ege University, Scientific Research Project (BAP), Project Number: 2016FEN054

Difference Equations with a Point Interaction

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In this talk, we consider a second-order difference equation with a point interaction on the whole axis. We first obtain Jost solutions of this boundary value problem and find the asymptotic equation of the Jost function. Then we determine the resolvent operator and describe the sets of eigenvalues and spectral singularities. Under appropriate conditions, we discuss the finiteness of eigenvalues and spectral singularities.

Keyword(s): Point interaction, boundary value problem, eigenvalues, spectral singularities.

Spectral Analysis of an Impulsive Quantum Difference Operator

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This paper studies spectral analysis and symmetries of quantum difference equations of second order together with an impulsive condition. By determining a transfer matrix, we investigate the locations of the eigenvalues and spectral singularities of an operatör corresponding to the q-difference equation.

Keyword(s): Impulsive conditions, quantum difference operator, eigenvalues, spectral singularities, symmetries.

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On Backlund Transformation of KdV Flow by Inextensibility

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In this work, we obtain new characterizations about inextensible flow and KdV flow. Also, we present a new approach for computing the geometry properties of curves by integrable geometric curve flows. We use ferromagnetic chain in some new solutions by using the KdV flow. Finally, we obtain figures of this solutions.

Keyword(s): KdV flow, Bäcklund transformations, inextensible flows, ferromagnetic chain

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New Time Meridian Surfaces of Some Type Smarandache S-Particles in Heisenberg Spacetime

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In this article, we consider biharmonic particle and its transformations by new time meridian surfaces in new Heisenberg spacetime. We use smarandache curves and obtain a analytical version of particle by time meridian surfaces in Heisenberg spacetime. We reach some classification results and the transformation conditions of new particles. Additionally, we express some interesting theorems. Finally, we give a new characterizations about transformations of our particles.

Keyword(s): Energy, Biharmonic particle, Bienergy, Faraday tensor, Heisenberg spacetime

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Numerical Solution of the Optimal Control Problem for Multilayered Materials

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The problem of the determination of the transmission conditions and stresses on the common boundary between layers is very important nowadays in terms of engineering and applied mathematics. In this study the optimal control problem for the deformation of the laminate formed by different materials is investigated.A numerical algorithm for determining the properties of the thickness and hardness of the coating, taking into account the maximalof the deformationpredicted by the influence of a certain force, is given. Physical and geometric interpretations of the obtained results are given with the help of a prepared computer program.

Keyword(s): Multilayered Material, Optimal Control Problem
Acknowledgement: This work is supported by the TUBITAK program 2221 - "Fellowship Program for Visiting Scientists and Scientists on Sabbatical Leave".

On the special case of the singular integral equation

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In this work, we study special case of the singular integralequation. An explicit representation of the solution is obtained and the problem solvability conditions are described. We use the method of thereduction the singular integral equation to the corresponding linear conjugationproblem [1-3]. The resulting solution can be used to study boundary value problems for equations of the mixed type.

Keywords: Singular integral equation, Cauchy kernel, Riemannboundary value problem.
Acknowledgement: This work is supported by the Scientific and Technological Research Council of Turkey (TUBITAK grant 2221 - "Fellowship Program for Visiting Scientists and Scientists on Sabbatical Leave").

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Oscillatory and asymptotic properties of nonlinear first order differential equations with piecewise constant argument of generalized type with positive coefficient

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In the paper, we consider first order differential equations with piecewise constant argument of generalized type with pisitive coefficient.Sufficient conditions for oscillation of all solutions are obtalned and the asymptotic behavior is studied also.

Keyword(s): neutral type, nonoscillatory and oscillatory solution, piecewise constant argument

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Eventual stability with respect to part of variables of nonlinear differential equations with non-instantaneous impulses

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The eventual stability with respect to part of variables of a nonlinear differential equation with non-instantaneousimpulses is studied using Lyapunov like functions. In these differential equations there are impulses, which start abruptly at somepoints and their actioncontinue on given finite intervals.Sufficient conditions for eventual stability, uniform eventual stability andeventual asymptotic uniform stability with respect to part of variables of the zero solution are established. Examples are given to illustrate the results.

Keyword(s): non-instantaneous impulses, eventual stability with respect to part of variables, Lyapunov functions
Acknowledgement: Research was partially supported by the Fund NPD, Universityof Plovdiv "PaisiiHilendarski", No. MU17-FMI-007.

A primal-dual interior point method for semidefinite programming problems based on a new efficient kernel function with trigonometric barrier term

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In this paper, we present a primal-dual interior point method (IPM) for semidefinite programming (SDP) problems, based on a new efficient parameterized kernel function. By simple analysis, we prove that the worst-case complexity for our algorithm based on this kernel function is $((p+1)\, n^{\frac{p+2}{2(p+1)}} \ln \frac{n}{\varepsilon})$, where $p \geq 2$, for large-update method. For small-update method, we obtain the best know iteration bound, namely $O(\sqrt{n} \ln \frac{n}{\varepsilon})$. This parameterized kernel function yields the similar complexity bound given by Bouafia et al. [2] for both large-update and small-update methods in linear programming.

Keyword(s): Linear Semidefinite Programming, Primal-Dual Interior Point Methods, Kernel Function, Complexity Analysis, Worst-Case Iteration Bound, Large and small-update methods,

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Existence Results for Nonlinear Boundary Value Problems With Integral Boundary Conditions

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In this talk, we are interested in the existence of solutions for semipositone boundary value problems with integral boundary conditions by means of a fixed point theorem on cones.

Keyword(s): Positive solution, fixed point theorem on cones, integral boundary value problem

Coefficient estimates for a new general subclass of bi-univalent functions

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In this study, a new general subclasses of bi-univalent functions introduced by using convolution.Bounds for the first two coefficients $|a_2|$ and $|a_3|$ for bi-univalent functions in this class are obtained. Theresults obtained also generalize the results in [T. Yavuz, Coefficient estimates for a new subclass of bi-univalent functions defined by convolution, Creat. Math. Inform. 27 No.1 (2018), 89-94.]

Keyword(s): Analytic Functions, Univalent Functions, Bi-Univalent Functions, Convolution.

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Coefficient inequalities of second Hankel determinant fora newsubclass of bi-univalent functions

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In this presentation, an upper bound for the second Hankel determinant, $H_2(2)$, is obtained for a certain subclass of bi-univalent functions in the unit disc. It also unifies the previous result for bi-starlike functions as a special case of our parameter.

Keyword(s): Analytic Functions, Bi-Univalent Functions, Hankel Determinant

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Diverse results for *p*-adic gamma functions arising from its Mahler expansion

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In this paper, we investigate multifarious identities and equations for *p*-adic gamma function and *p*-adic Euler constant with the help of weighted *p*-adic *q*-integral on Z_p and Mahler expansion of the *p*-adic gamma function. We examine some correlations including p-adic gamma function, weighted *q*-Daehee polynomials and numbers and weighted *q*-Daehee polynomials and numbers of the second kind. We lastly provide an intriguing representation for the *p*-adic Euler constant through the weighted *q*-Daehee polynomials and numbers.

Keywords: *p*-adic numbers, *p*-adic gamma function, *p*-adic Euler constant, Mahler expansion, *q*-Daehee polynomials, *p*-adic *q*-integral.

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Various Correlations between the (*ρ,q*)-Boole Polynomials and *p*-adic Gamma Function

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In this paper, we primarily consider generalizations of the Boole polynomials arising from the fermionic*p*-adic (ρ,q)-integral on Z_{p} and then investigate their several basic properties. For the mentioned polynomials, we obtain new and interesting relations and formulas including symmetric relation, recurrence relations and correlations associated with the (ρ,q)-Euler polynomials, and Stirling numbers of the first and second kinds. We then discover multifarious relationships among the two types of (ρ,q)-Boole polynomials and *p*-adic gamma function. Also, we compute the p-adic (ρ,q)-integral of the derivative of *p*-adic gamma function. Moreover, we present a new representation for the *p*-adic Euler constant by means of the (ρ,q)-Boole polynomials and numbers. We finally explore an explicit formula for *p*-adic Euler constant.

Keywords: Mahler expansion, (*p,q*)-calculus, *p*-adic analysis, Boole polynomials, Bernoulli polynomials, Stirling numbers of the first kind, Stirling numbers of the second kind, *p*-adic gamma function.

Conformable Fractional Partial Differentiation on Multidimensional Time Scales

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In 2014, a new definition of the fractional derivative called conformable fractional derivative was given by the authors Khalil et. al. [1]. This definition was developed in various studies. In 2016, a natural extension of the conformable fractional derivative to time scales was given in [2]. This study also extended the time scale calculus fractional time scale calculus. In this study, we introduce the notion of a conformable partial differentiation of order α on time scales, give some properties of the concept, and reveal the relation between the conformable partial differentiation on time scales and the classical partial delta differentiation.

Keyword(s): Differential invariants; surfaces; Bonnet’s theorem

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Differential Invariants of Non-degenerate Surfaces

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A curve in $\mathbb{R}^3$ is uniquely determined by two local invariant quantities, curvature and torsion, as functions of arc length. Similarly, a surface in $\mathbb{R}^3$ is uniquely determined by certain local invariant quantities, the first and second fundamental forms. In [1], it is studied that the equivalence condition of compared two different control point systems under the linear similarity transformations $LS(2)$ in $\mathbb{R}^2$ according to the invariant system of these control points. In [2], the complete system of global differential and integral invariants of a curve in Euclidean geometry is given. In this study, we give other complete systems of $SM(3)$-invariants of non-degenerate surfaces and complete systems of $M(3)$-invariants of non-degenerate surfaces.

Keyword(s): Differential invariants; surfaces; Bonnet's theorem

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On the properties of approximation of the $(p;q)$-hybrid Durrmeyer type operators

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In this study, we introduce $(p;q)$-hybrid Durrmeyer-Stancu type operators. We investigate their approximation properties. We give a weighted approximation theorem and obtain rates of convergence of these operators for continuous functions.

Keyword(s): q-Stancu type operators, $(p;q)$- hybrid operators, $(p;q)$- calculus, weighted approximation, rates of approximation.

On Some Properties of Even Fibonacci and Lucas Numbers with Suborbital Graphs

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The pair of $(\Gamma, \widehat{\mathbb{Q}})$ is represents the action of the Modular Group Γon the rational projective line$\widehat{\mathbb{Q}}$, which is extended rational set. This action is transitive and also imprimitive. From the action suborbital graphs were given on the upper half plane

$$\mathbb{H} \coloneqq \{z \in \mathbb{C}: Im(z) > 0\}.$$

In this work, we give some properties of even Fibonacci and Lucas Numbers. From these properties we get some connections between the vertices of trees on the suborbital graphs and these special number sequences.

Keyword(s): Fibonacci Sequence, Lucas Sequence, Suborbital Graphs.

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On Some Connections Between Suborbital Graphs and Fibonacci- Lucas Matrices

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The suborbital graphs are formed by the imprimitive action of the Modular group Γ on the set of extended rational numbers.

In this work we showed the relation of the some special vertices of these suborbital graphs and the Fibonacci-Lucas matrices. We obtained some results with these connections.

Keyword(s): Suborbital Graphs, Fibonacci Numbers, Lucas Numbers, Modular Group.

A Validation for Dirichlet Problem

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Euler method is often referred method because of ease of use and usefulness for ordinary differential equation. Usefulness is arises from simplicity and error analyses comfortableness. It is convenient for a second order differential equation because of reductibility. It is also used for Dirichlet problem. Analytical solution is compared with numerical approach. Analytical solution, numerical approach and error analyses are together reconfigured. Analytical solution is done Evolutionary Approach to Electromagnetics' frame. Despite the fact that the approach is to be required solution of Klein-Gordon equation, it is just validated with 0.02 step Dirichlet problems' numerical approach and analytical solution.

Keyword(s): Dirichlet boundary-value problem, analytical solution, numerical solution, Maxwell equations, TM time-domain mode

A Simulation Based Mathematical Modeling and Analytical Analysis of Maxwell Equation for Breast Tumor Detection

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Since breast cancer is the most common cancer type among women, detection of tumor non- destructively has vital importance. The scattering of the electromagnetic field is used to model mathematically the tumor detection. To express the scattered field we benefit from Maxwell equations. We assume the tumor is a lossy dielectric sphere and the breast is lossy dielectric medium, but tumor has different dielectric constant from normal breast tissue. Under this assumption we use Maxwell equations to calculate the scattered field from the tumor. The field scattered from the tumor is different from the other tissues because they have different dielectric constant. The field scattered from spherical tumor is calculated analytically. And in addition to detect the tumor non destructively the finite difference time domain method (FDTD) which is a effective numerical method is used to simulate the field distribution. Simulation results is achieved successfully thanks to MATLAB.

Keyword(s): Breast Tumor, Maxwell Equations,Scattered Field, Finite Difference Time Domain(FDTD)

Analysis of the Questions of the 5th Grade Mathematics Text Book with Daily Life

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The Mathematics Curriculum, which was updated in 2018, it was attached importance to associating mathematical concepts with daily life. In this sense, it is important that the subjects in mathematics textbooks are related to daily life. The aim of this study is to examine the relation between the questions in the 5th Grade Mathematics Textbook which was taught in 2017-2018 academic year and daily life. For this purpose, the document analysis was used. The data will be analyzed andfindings will be presented.

Keyword(s): Mathematics Text Book, Daily Life, Document Analysis

Draw a Mathematics Lesson: Middle School Students' Perceptions About Mathematics Lesson

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Determining students' perceptions of "mathematics course" can be used in changing their negative thoughts and their prejudice against the course and in arranging the instructional-educational environment according to students. Drawings are important instruments in revealing students' thoughts. Drawings, which are also among alternative tools of measurement and evaluation, enable individuals to express themselves in free without any limitations and thus they make it possible to collect data. This study aims to determine a group of middle school students' perceptions concerning mathematics course. The study, conducted in qualitative research design, included 96 students in total 52 of whom were girls and 44 of whom were boys. The participants were chosen through convenience sampling. The data was collected through "Draw a Mathematics Course Test" and interviews with students. "Draw a Mathematics Course Test" was developed by the researchers so as to determine students' perceptions of mathematics course. Space was provided in the test so that they could draw a picture and they were asked to draw a picture. Students were asked questions about their drawings of mathematics course and about their feelings and thoughts in the interviews. The data was then put to content analysis. The researchers did the analyses together and they reached agreement on distinguishing the categories by discussing. It was found in general that the participants included classroom setting and mathematical expressions in their drawings. Based on this, it is recommended that more associations should be made with out-of-the-school learning environments and with daily life to make mathematics lesson more than one taught or learnt between four walls.

Keywords: Mathematics course, middle school students, perceptions

Inference of Time Series Chain Graphical Model

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The time series chain graphical model (TSCGM) is a one of the common graphical models to represent the repeated multivariate time series observations. In this model, we can describe the interactions between genes in time courses gene expression datasets which indicate the steady-state activations of the genes throughout the time [1]. In inference of this complex model, different approaches are suggested such as the EM algorithm and Kalman filtermethod. These inference methods use the time series model like the state-space model or the vector of auto-regression to describe the measurements. Later, these two stage models are converted under a single model by combining the Gaussian graphical model with the dynamic Bayesian model. Then, the inference of this new model's parameters which are the precision matrix of the vector of autoregressive process of order 1 (VAR(1)), Ω, and the precision of the Gaussian model, Θ, is computed by the penalized likelihood inference method with a smoothly clipped absolute deviation penaltyapproach. Thereby, in this study, we suggest alternative approaches to model the gene-gene interaction time-course data via a semi-bayesian estimation. In inference, we obtain the precision matrix of the Gaussian graphical model Θvia the reversible jump Markov chain Monte Carlo method (RJMCMC) [2]. Then, we bind the observations through time by checking the intersection of the estimated precision matrices Ω's found from each time point, i.e., dynamic Bayesian networks. If the entry of Ω_{ij}(i=1, 2, …T where T is the total time points and j=1, 2, …, m where m is the total number of genes) equals to zero for all i, then we set the link of j indicating the interaction between two genes to zero. Here, since we assume that the states have the multivariate normal densities, the zero entry in the precision matrix shows the conditional independence between the given two genes. Alternatively, we also transform Ω in each time point to the Gaussian distribution via the Gaussian copula. Later, we consider to take the mean of the elements by time so that we can get a single matrix Θ whose entries are computed from these means. Finally, we implement the RJMCMC method to infer Θ. We evaluate the performance of each suggested approach in real datasets and compare our findings with respect to the gain in the accuracy of estimates.

Keyword(s): Time series chain graphical model, Gaussian graphical model, Vector of autoregressive process of order 1, reversible jump Markov chain Monte Carlo method, Biological networks.

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Information Complexity Criterion in the Gaussian Graphical Model: Real Data Applications

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In statistical modeling, the model complexity is one of the fundamental concepts in the selection of the optimal model among alternatives. Hereby, regarding the sorts of data, there are a number of model selection criteria exist in the literature. AIC and BIC are two most famous approaches in this area. These criteria mainly aim to adjust a balance between the lack of fit of the model and the model complexity by using the independent parameters estimated. The information complexity criterion [1], shortly ICOMP,is a measure of complexity which is used to select the best model by taking into account the interdependence between the parameters. For this purpose, it applies the inverse of the Fisher information matrix of the model. From previous analyses under various models and Monte Carlo studies for certain biological networks, it has been shown that ICOMP can detect more accurate model for the data with respect to the results of AIC, BIC and its alternates. Whereas, this criterion has not been implemented in the model selection of the actual biological networks whose major features are their sparsity under high dimensions. In this study, as the novelty, we derive ICOMP for real biological networks which are modelled by the Gaussian graphical model (GGM)[2]. GGM is one of the well-known approaches to describe the steady-state behaviour of the biological systems. In this model, it is assumed that the state of the system has the multivariate normal distribution while the systems' components are conditionally independent. In inference of GGM, among many choices, the graphical lasso (glasso) [3] method is the most common approach whose calculation is based on the penalized likelihood equation under a lasso regression. Accordingly, in this calculation, we select the penalty constant in GGM which adjusts the connectivity between the systems' elements by performing ICOMP. For this purpose, we apply our original R codes of ICOMP derived under the multivariate normal density for the inference of bench-mark real biological datasets. Then, we evaluate the performance of ICOMP with its strong alternativesin terms of accuracy and computational demand.

Keyword(s): Information complexity criterion, Gaussian graphical model, Biological networks, Model selection.
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Optimal Estimation of Scale Invariant Wigner Spectrum Using Multitapers

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In this work, we investigate the optimal estimation of the scaleinvariantWigner spectrum (SIWS) in themean squares of errors sense, for the class of Gaussian locally self-similar processes, by two methods: the multitaper method, and using the Lamperti transform of Hermite functions. In the multitaper method, the spectrum is estimated as a weighted sum ofscale invariant windowed spectrograms. Also, we show that the estimated spectrum is computed as a weighted sum of finite spectrograms in which only a few coefficients are non-zero Moreover, it is shown that the optimal multitapersare approximated by the quasi Lamperti transformation of Hermite functions,which is computationally more efficient. Finally, the performance and accuracy of theestimation method is studied via simulation.Furthermore, the mean square error optimal scale invariant multitaper spectrogram estimator for aclass of Gaussian locally self-similar processes is evaluated and compared to the scaleinvariantWigner distribution, which is a classical estimator of SIWS. An evaluation isalso made for the classes of locally self-similar chirp processes, and multicomponentlocally self-similar processes. The results show that, dealing with scale invariant processes,current methods of non-stationary spectrum estimation should be modified tobe reconciled to the scale invariant property. Moreover, it is shown that the windowsin multitaper method are well approximated by the quasi Lamperti transform of a setof Hermite functions, which is beneficial in calculation.

Keyword(s): Multivariate discrete scale invariant processes, Generalized likelihood ratio test, Multivariate simple Brownian motion.

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Detection of Multivariate Discrete Scale Invariant Processes Using GLR Test

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Detecting discrete scale invariance, is one of the most important problems in analysis ofstochastic processes. In this paper, we provide a new method in detecting continuous-timemultivariate discrete scale invariant processes, using an asymptotic generalized likelihoodratio test (GLRT). We consider two hypothesis tests: 1) Is a multivariate process, DSI oris it self-similar? 2) Is a multivariate process, DSI or is it nonstationary? Then, using theasymptotic GLRT, the DSI behavior can be detected. In this method, by imposing some flexible sampling scheme, we provide some discretization of continuous time discrete scaleinvariant processes. Then, the relationship between a discrete-time DSI process and acorresponding multidimensional self-similar process, enables us to formulate the problemas a test for covariance structure of the processes. For DSI and self-similar processes,the covariance matrices are as a product of scale matrices to a block-Toeplitz matrix, inwhich there is no a closed form of maximum likelihood for such matrices. So, by considering the asymptotic case, where the block-Toeplitz matrix converges to a block-circulantmatrix, the asymptotic GLRT is derived. To clarify the proposed method, an exampleas a multivariate simple Brownian motion is presented and its simulations are provided.The superiority of the proposed detector is investigated for the S&P500 and Daw Jonesindices for some special periods, to detect the discrete scale invariance behavior in suchprocesses. The key point in analysis of stochastic process is: If a process is discrete scaleinvariant (DSI), then this fact can usually be exploited in applications to improve theestimation performance. Treating a process as DSI, when in fact it is not, generally leadsto very poor performance. So, the presence or absence of DSI property, leads to adopting different actions in analysis of stochastic processes. Some methods have been proposed todetect DSI behavior, but most of them have been presented for scalar-valued time series,even though some of the scalar detectors could easily be extended to multivariate time series. Now, applying the proposed detector on vector-valued stochastic processes, enablesus to test discrete scale invariance vs. self-similarity, and also, discrete scale invariancevs. nonstationarity.

Keyword(s): Multivariate discrete scale invariant processes, Generalized likelihood ratiotest, Multivariate simple Brownian motion.

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S_3 –Graded $iso(1,3)$

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Symmetries have an important field in mathematic , physics and engineering. A great majority of symmetries are expressed by Poincare symmetries. As known that 4-dimensional Poincaré group $ISO(1,3) = SO(1,3) \otimes T^4$ is semi-direct product of $SO(1,3)$ Lorentz transformation group and T^4 translation group in four dimensional space.Poincaré algebra the corresponding to $ISO(1,3)$ group is denoted with $iso(1,3)$ .This algebra is satisfied with following comutation relations[3]

$$\left[L_{mn}, L_{pq}\right] = I_{nq}L_{pm} - I_{mq}L_{pn} + I_{np}L_{mq} - I_{mp}L_{nq}$$

$$\left[L_{mn}, P_p\right] = I_{np}P_m - I_{mp}P_n \quad \text{and} \quad \left[P_n, P_m\right] = 0$$

Purpose of this work, obtain cubic roots of $U(iso(1,3))$ universal enveloping algebra.Four dimensional cubic symmetries were obtained by using a different approach in [2]. However, in this study

S_3 –graded Poincaré algebra is obtained by using the algebraic approximation method ([1]) in the Hopf algebra formalism. Since the method in [1] has more computational efficiencies, it will be easier to form Fractional supergroups which is difficult to obtain. This algebra is denoted with $U_3^N(iso(1,3))$.

Keyword(s): Poincaré symmetries, Graded, Semi-direct

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Fractional Super $su(2)$ Algebras

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Lie algebras, Lie groups and their representations are very important in mathematics, physics and engineering literature. For example, Gauge symmetries are given with SU(n) groups and SU(2) is represent the weak interaction. Afterwards, a different generalization of differential geometry and Lie groups (or Lie algebras) are studied some of the most important generalizations are Quantum groups and algebras. New algebraic symmetry structures which have application in many fields of physics are existed by owing these groups and algebras. The fundamental structure of this is $su_q(2)$ quantum group which is similar to angular momentum(Woronowicz, 1992). Furthermore, Supersymmetry has been a popular work area for nearly 25 years. Fractional supersymmetric algebras are a generalized form of supersymmetric Lie algebras. There are lots of generalizations of fractional supersymmetric algebras (Raush deTraunbenberg, Slupinski, 1997; Kerner, 1992; Ahn, Bernard, Leclair, 1990; Ahmedov, Dayi, 2000; Ahmedov, Yildiz, Ucan, 2001).

In this study, Fractional super $su(2)$ algebras for M=1,2 and 3 are obtained by using the method in (Ahmedov, Yildiz, and Ucan, 2001). This algebra is denoted by $U_3^M(su(2))$.

Keyword(s): Fractional superalgebra, Lie algebra, Supersymmetry

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A Note on Spacalike Surfaces via Inclined Curves As Geodesics

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In this study, a spacelike surface whose one of the principal curvatures is identically constant, is examined in Minkowski 3-space E_1^3. Some results are given for spacelike surfaces in which inclined curves lie as geodesic curves.

Keyword(s): Minkowski space, Spacelike surface, Inclined curves, Geodesics

On The Darboux Rotation Axis of Null Cartan Curves Due to the Bishop Frame

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In this study, the Darboux rotation axis of a null Cartan curve is obtained due to the Bishop frame. The axis is decomposed into two simultaneous rotations. By a simple mechanism, the axes of these simultaneous rotations are joined to each other. Also, some characterizations of null CartanDarboux helices are given due to the Bishop frame.

Keyword(s): Bishop frame, Null Cartan curve,Darboux rotation axis, Null CartanDarboux Helix

Multiple positive solutions for nonhomogeneous problem

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In this work, we establish the existence of solutions for a nonhomogeneous problem involving critical nonlinearities. We prove that the problem admits at least positive solutions under suitble conditions on the curvature of the domain on the boundary and the homogeneous term.

Keyword(s): Elliptic problem, critical exponents, boundary singularities.

On a class of nonlinerar problem with singularities

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In this talk, we seek the existence of solutions for a nonlinear elliptic equations involving critical nonlinearities. We prove that the problem is closely connected with the position of the singularities and the sign of the curvature of the domain on the boundary.

Keyword(s): Elliptic problem, critical exponents, boundary singularities.

Factors Affecting Algebraic Attitudes of Middle School Students

Ortaokul Öğrencilerinin Cebirsel Tutumlarını Etkileyen Faktörler

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Bu çalışmanın genel amacı, ortaokul öğrencilerinin cebire yönelik tutumlarını belirlemek ve bazı değişkenlere gore tutumu etkileyen faktörleri belirlemektir. Araştırma, tarama modelinde betimsel olarak tasarlanmıştır. Araştırmanın örneklemini, 2017-2018 Eğitim Öğretim Bahar döneminde Adana ili merkez ilçelerine bağlı okullardan amaçlı örneklem yöntemine göre seçilen sosyo ekonomik düzey açısından orta üst düzey de öğrenim gören 305 öğrenci oluşturmaktadır. Veri toplama aracı olarak kişisel bilgi formu ve öğrencilerin cebire yönelik tutumlarını belirlemekamacıyla “CebirselTutumÖlçeği” de kullanılmıştır. Toplam 25 maddeden oluşan ölçek “olumlu tutum” ve “olumsuz tutum” alt boyutlarından oluşmaktadır. Ölçeğin tamamı ve alt boyutlarının iç tutarlılık güvenirlik değeri için Cronbach Alfa değerleri incelenmiştir. Ölçeğin tamamı için iç tutarlılık güvenirlik değeri 0.92, olumlu tutum alt boyutu için 0.93, ve olumsuz tutum alt boyutu için ise 0.80’dir. Verilerin analizi aşamasında; yüzde, frekans, standart sapma ve bağımsız gruplar t testi, Tek yönlü ANOVA tekniği uygulanmıştır. Buna gore araştırmaya katılan öğrencilerin cebire yönelik olumlu ($\overline{X}$ =3,07) ve olumsuz ($\overline{X}$ =3,03) tutumlarının aritmetik ortalamalarının birbirine yakın olduğu ve bu konuda “karasız” oldukları sonucuna ulaşılmıştır. Ayrıca cinsiyet, sınıf düzeyive akademik başarı açısından cebire yönelik tutumlarında farklılıklar olduğu sonucuna ulaşılmıştır.

Keyword(s): CebirselTutum, Cinsiyet, MatematikbaşarıveOrtaokulÖğrencileri

Ortaokul Öğrencilerinin Cebirsel Düşünme Düzeylerinin İncelenmesi

Examination of Algebraic Thinking Levels of Middle School Students

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Bu çalışmanın genel amacı, öğrencilerin cebirsel düşünme düzeylerini belirlemek ve bazı değişkenlere gore düşünme düzeyini etkileyen faktörleri incelemektir. Araştırma, tarama modelinde betimsel olarak tasarlanmıştır. Araştırmanın örneklemini, 2017-2018 Öğretim döneminde Adana ilimerkez ilçelerine bağlı okullardan amaçlı örneklem yöntemine göre seçilen sosyo ekonomik düzey açısından orta üst düzeyde öğrenim gören 305 öğrenci oluşturmaktadır. Veri toplama aracı olarak kişisel bilgi formu ve Hart ve diğerleri (1998) tarafından hazırlanan“Cebirsel DüşünmeTesti” kullanılmıştır. Bu test, öğrencilerin cebirsel düşünme düzeylerini belirlemeye yönelik sorulardan oluşmaktadır.Bu testin 1-6. soruları birinci düzeyi; 7-12. Soruları ikinci düzeyi; 13-21. soruları üçüncü düzeyi ve diğer sorular ise dördüncü düzeyi belirlemeye yöneliktir.Verilerinanaliziaşamasında; yüzde, frekans, standart sapma,bağımsızgruplar t testi veTekyönlü ANOVA tekniği uygulanmıştır.Buna görearaştırmada öğrencilerin cebirsel düşünme açısından düzey-2 ve düzey-3 seviyesinde yığıldıkları belirlenmiştir. Yığılmanın en az olduğu düzeylerin ise düzey-0 ve düzey-1 seviyesi olduğu saptanmıştır.

Keyword(s): Cebirseldüşünmedüzeyi, Cinsiyet, Matematikbaşarısı, Ortaokulöğrencileri
Acknowledgement: Optinonal

Optical Solutions in Birefrigent Fibers with Two Integration Function Process

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In this article, two integration function process for solving the nonlinear Schrödinger equation is introduced. These are extended Jacobi's elliptic function approach and exp(-Φ(φ))-expansion method. The being condition for these solutions are also found that are conferred as definite provision. The found solutions are identified bright optical soliton, dark soliton, singular soliton and traveling wave solutions. Reliability of our solution is given graphical consequens. The solutions of our equation are computed in the form of rabidly convergent series with easily calculable components by using mathematica software package. Reliability of the method is given graphical consequens and series solutions are made use of to illustrate the solution. The found consequens show that the method is a power and efficient method in determination of solution the nonlinear Schrödinger equation.

Keyword(s): Jacobi's elliptic function, exp(-Φ(φ))-expansion method, Birefringent fibers, The nonlinear Schrödinger equation, Solitons.

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A New Numerical Solutions for Fractional (1+1)-Dimensional Biswas-Milovic Equation

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In this work, fractional (1+1)-dimensional Biswas-Milovic equation that defines the long-space optical communications solved by using the residual power series method (RPSM) . The RPSM gets Maclaurin expansion of the solution. The solutions of present equation are computed in the shape of quickly convergent series with quickly calculable fundamentals by using mathematica software package. Explanation of the method is given graphical consequens and series solutions are made use of to represent our solution. The found consequens show that technique is a power and efficient method in conviction of solution for the fractional (1+1)-dimensional Biswas-Milovic equation.

Keyword(s): Residual power series method, (1+1)-dimensional Biswas-Milovic equation, Series solution

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Boundary Components of Fricke Group

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Let $D = C^+$ denote the upper half plane. With the Poincare metric $ds = |dz|/y$, it becomes a model of the hyperbolic plane. A non-Euclidean crystallographic(NEC) group is a discrete subgroup Γ of the group $\mathcal{G}$ of isometries of D for which D/Γ is compact. If Γ contains only orientation preserving isometries then it is called a Fuchsian group. An NEC group is determined by its signature

$$\left(g; \pm; [m_1, \cdots, m_r]; \left\{\left(n_{11}, \cdots, m_{1s_1}\right), \cdots, \left(n_{k1}, \cdots, m_{ks_k}\right)\right\}\right)$$

If Γ has this signature then D/Γ is an orbifold whose underlying space is a surface of genus g with k boundary components (holes) and it is orientable if the sign + and non-orientable otherwise. There are r cone points of angle $2\pi/m_1, \cdots, 2\pi/m_r$ in the interior of D/Γ and s_i corner points of angle $\pi/n_{i1}, \cdots, \pi/n_{is_i}$ around the ith hole. If Γ has this signature then the area of its fundamental region is

$$\mu(\Lambda) = 2\pi\left(\alpha g + k - 2 + \sum_{i=1}^{r}(1 - 1/m_i) + \frac{1}{2}\sum_{i=1}^{k}\sum_{j=1}^{s_i}\left(1 - 1/n_{ij}\right)\right)$$

Where $\alpha = 2$ if the sign is $+$ and $\alpha = 1$ otherwise. In this study, we examine an invariant, the number of boundary components, in the signature of an NEC group. We will discuss the following NEC group which is called Fricke group:

$\Gamma_F(N) = \langle \Gamma_0(N), \begin{pmatrix} 0 & 1 \\ N & 0 \end{pmatrix} \rangle$ where $N = n^2$ and n is any positive integer.

Keyword(s): NEC group, signature, Modular group,

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Pascal Triangle Obtained by Modular Group

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It is known that Pascal numbers and Fibonacci numbers are very important in combinatorial analysis [5]. In [4] it was shown that many properties of Fibonacci numbers are deduced and related with the so-called Pascal-2 triangle. The paper is organised as follows: In Section2 and 3, we give some well-known concepts about on modular group and its group action as preliminaries. In section 4, we will give main theorem of this study. After, by using this theorem, in section 5, we will give some new results related to Pascal Triangle and Fibonacci Numbers via action of modular group on extended rationals.

Keyword(s): modular group, pascal triangle, fibonacci numbers.

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Using 2DRH wavelet bases for approximated of solution of nonlinear Fredholm integral equations in complex plane

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In this work we have introduced a computational method for a class of two-dimensional nonlinear Fredholm integral equations in complex plane, the base of this method by using on 2D-Haar wavelet. For this purpose, we define the integral operator, and with use the properties of Haar wavelet we calculatedan operational matrix and with using 2D-Haar wavelet we approximated solutions of my integral equations. In addition, by using Banach fixed point theorem, we proved our method is convergence.Finally,we presentedsome numerical examples.

Keyword(s): 2D nonlinear Fredholm integral equations; 2D RH wavelet; complex plane.

In this paper, we approximate the solution of the 2D mixed Volterra Fredholm integral equation using 2D RH wavelets, for this purpose we consider the 2D mixed Volterra Fredholm integral equations of the form

$$u(x,y) = f(x,y) + \int_0^1 \int_0^1 R\big(x,y,t,s,u(t,s)\big)dtds\,.(1)$$

Where $x, y, t, s \in [0,1]$, $u \in X = C([0,1]^2)$ and$f\colon [0,1]^2 \to R^2$, and $R\colon [0,1]^4 \times R^2 \to R^2$,is assumed to be known continuous functions satisfying the Lipschitz condition, that isthere exist$M \geq 0$ such that:

$$\big|R\big(t,s,v_1(x,y)\big) - R\big(t,s,v_2(x,y)\big)\big| \leq M|v_1 - v_2|,$$

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A Quadratic Programming Model for Obtaining Weak Fuzzy Solution of Fuzzy Linear Systems

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Real life applications arising in various fields of Engineering and Sciences like Electrical, Civil, Economics, Dietary etc. can be modeled using system of linear equations. In such models it may happen that the values of the parameters are not known or they cannot be stated precisely only their estimation due to experimental data or experts knowledge is available. In such situation it is convenient to represent such parameters by fuzzy numbers. In this paper we proposed an efficient optimization model for obtaining a weak fuzzy solution of fuzzy linear systems (FLS). We solved some examples and we showed that this method is always efficient.

Keyword(s): Fuzzy number, quadratic programming, fuzzy linear systems

Backward stochastic differential equations associated to Jump Markov processes with Locally Lipschitz coefficient

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The well-posedness of class of backward SDE driven by jump Markov process and an independent Brownian motion is investigated. Existence and uniqueness results to this kind of equations are obtained in both globally and locally Lipschtz cases. To this purpose, we .rst treat the Lipschitz case as an intermediate result. Then, for the locally Lipschitz case, we construct a sequence of globally Lipschitz BSDEs having the existence and the uniqueness propriety, in order to show, by passing to the limite, the existence and uniqueness of solution to the initial problem. A stability theorem is also proved in the local Lipschitz setting.

Keywords: Backward stochastic differential equations, jump Markov process, Brownian motion.

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Methods for solving vector optimization Problems

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In this paper, we consider a vector optimization problem. To obtain information about the coefficient solutions of this problem we use the following methods: weighting method and constraint method. Some graphical representations are given to illustrate the coefficient values.

Keywords: Coefficient solutions, weighting method, constraint method.

On the remainder term in some bivariate approximation formulas based on linear positive operators

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We discuss about the remainder terms of the bivariate approximation formulas of Bernstein, Bernstein-Schurer-Stancu and respectively Stancu (based on factorial powers). Some representations of mentioned remainders in terms of bivariate divided di_erences are presented. There are also established some mean value properties.

Hidden Bifurcation in Multiscroll Chua Attractors Generated via Saturated Function Series

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The aim of our work is to study the hidden bi_urcation in dynamical systems. The first appear of this method was by genuine Leonov and kuznetsov who proposed an analytical numerical method. We study the multiscroll chua attractors generated via Saturated Function series and check some numerically results method obtained for value of parameter and n.

Keywords: Hidden Bifucation, Multiscroll Attractors, Chua's System.

On the adaptive classical Bernstein quadrature Formula

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In the present talk, we want to highlight an applicative side of classical Bernstein polynomials [1], [2], in contrast to the well-known theory of the uniform approximation of functions. An example in this sense could be the approximation of various surfaces areas by using the classical Bernstein quadrature formula. We know that composite quadrature formulas are e_ective in most situations, but occasionally they cannot be applied because they use equally-spaced nodes. The application of them is inappropriate, once a small step size is used uniformly across the entire interval of integration to ensure the overall accuracy. This does not take into account that some regions of the curve may have large functional variations that require more attention than other regions of the curve. It is useful to introduce a method that adjust the step size to be smaller over regions of the curve where a larger functional variation occurs. An efficient technique for this type of problems should predict the amount of functional variation and adapt the step size as necessary. Such of technique is know as adaptive quadrature formula.

Acknowledgement. The results presented in this abstract were obtained with the support of the Technical University of Cluj-Napoca through the research Contract no. 2011/12.07.2017, Internal Competition CICDI-2017.

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Some estimates for rough Riesz type potential operator with variable order and rough fractional maximal operator with variable order both on generalized variable exponent Morrey spaces and vanishing generalized variable exponent Morrey spaces

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In this paper, we dwell on Adams-Spanne type estimates applying some properties of variable exponent for rough Riesz type potential operator with variable order and rough fractional maximal operator with variable order on generalized variable exponent Morrey spaces, respectively. In fact, the results in this paper are generalized of some known results on an operator basis.

Keywords: Riesz type potential operator; fractional maximal operator; rough kernel; variable exponent; generalized variable exponent Morrey space.
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Stochastic optimal control for systems of a linear forward backward doubly SDEs of mean-field type

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This paper establishes the existence of strong optimal solutions of a control problems in which the control systems are governed by linear forward backward doubly stochastic di_erential equations of mean-_eld type (MFFBDSDEs), with random coe_cients and non linear functional cost. Under the convexity of the control domain and the cost functions, the existence of strong optimal control, adapted to the initial-algebra is proved. Moreover, we establish necessary as well as sufficient optimality conditions for this control problem of linear MF-FBDSDEs.

Keywords: Mean-field; Forward backward doubly stochastic di_erential equations; Strong strict control; convex optimization principle; Existence; necessary and sufficient optimality conditions.

On the Durrmeyer Type Modification of the Szasz Mirakyan Operators

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The present paper deals with a generalization of the Szasz Mirakyan operators. Our results are based on a ρ function. We give sufficient conditions which ensure weighted uniform convergence on the semi-axis and quantitative estimate in weighted space. Also, a Voronovskaya type results is given. Our generalization allows us to take general results to special classes of operators rediscovering known operators.

Keyword(s): Szasz Durrmeyer operators, Weighted modulus of continuity, Voronovskaya theorem

Rate of Pointwise Convergence for Generalized Szasz Mirakyan Operators

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The concern of this paper is to introduce Durrmeyer modifications for the generalized Szasz Mirakyan operators. We obtain uniform convergence of the operators and determine the degree of this uniform convergens. Then we give local approximation properties. Further we prove a Voronovskaya type theorem in quantitative form.

Keyword(s): Szasz Mirakyan Operators, King Type Operators, Korovkin Type Theorem

The relaxed stochastic maximum principle in optimal control of di¤usions with controlled jumps

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This paper is concerned with optimal control of systems driven by stochastic di¤erential equations (SDEs), with jump processes, where the control variable appears in the drift and in the jump term. We study the relaxed problem, in which admissible controls are measure-valued processes and the state variable is governed by an SDE driven by a counting measure valued process called relaxed Poisson measure such that the compensator is a product measure. Under some conditions on the coe¤ecients, we prove that every di¤usion process associated to a relaxed control is a limit of a sequence of di¤usion processes associated to strict controls. As a consequence, we show that the strict and the relaxed control problems have the same value function. Using similar arguments, we prove the existence of an optimal relaxed control. In a second step, we establish a maximum principle for this type of relaxed problem.

Keywords: Stochastic control, Stochastic differential equation, jump process, optimal control, relaxed control, maximum principle.

Voronovskaya-type theorems for Urysohn type nonlinear Bernstein Operators

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The concern of this paper is to continue the investigation of convergence properties of nonlinear approximation operators, which is de_ned by the author in [15]. In details, the paper centers around Urysohn type nonlinear counterpart of the Bernstein operators. As a continuation of the study of the author [15], the present paper is devoted to obtain Voronovskaya-type theorems for the Urysohn type nonlinear Bernstein operators.

Keywords: Urysohn integral operators, nonlinear Bernstein operators, Urysohn type non-linear Bernstein operators, Voronovskaya-type theorem.

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3-6 July 2018, Istanbul, Turkey

The approximation of some Polynomial by basis of Bernstein polynomial with using Bezier curve

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In this paper we give the decomposition of a polynomial of degree n less or equal to 3 in the base of bernstein (theorem of approximation of weierstass) and the decomposition of a same polynomial of degree n 0 in the base of bernstein (we use the dual base), then we make the comparison between the two approximations. In other part, take the example of the approximation of f(t) = cos(100t) by Bezier curve and the equidistantial interpolation of (n + 1) points of the function f. we show that the first approximation is the good one.

Keywords: base of bernstein, approximation , equidistantial interpolation, Bezier curve.

Numerical solution of Falkner-Skan equation by iterative transformation method

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In this study, we investigate the nonlinear boundary-layer equation of Falkner-Skan defined on a semi-infinite domain. An iterative finite difference (IFD) scheme is proposed to numerically solve such nonlinear ordinary differential equation. A computational iterative scheme is developed based on Newton-Kantorovich quasi-linearization. At every iteration, the obtained linearized differential equation is numerically solved using the standard finite difference method. Numerical experiments show the accuracy and efficiency of the method compared to existing solvers. The computation is performed for different parameter values, including the special case of Blasius problem.

New Results for Generalized Null Mannheim curves in 4-dimensional Semi-Euclidean Space with Index 2

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In this talk, we give the necessary and sufficient conditions for null curves in 4-dimensional semi-Euclidean space with index 2 to be generalized null Mannheim curves in terms of their curvature functions and Frenet vectors by taking consideration of the plane spanned by the first binormal and the second binormal vectors, which in the case of a lightlike plane, seperately. Also the related examples are given.

Keywords: Generalized Mannheim curve, Semi-Euclidean Space, Cartan null curve.

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Existence of Positive Solutions for a Second-Order Multi-Point Boundary Value Problem with Delay

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In this work, we study the existence of three positive solutions to a type of Multi-point boundary value problems for second-order delay differential equations, and we obtain the result that there exist at least three nonnegative positive solutions by means of a generalization of the Leggett-Williams fixed point theorem.

Keywords : Positive solution, Fixed-point theorem, Multi-point boundary value problem, Delay differential equation.

The Solution of Water Wave Equation Under the Galerkin Method

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We consider the water wave equation. We consider the existence of solutions using the standard Faradeo–Galerkin method. Using the Galerkin method, we establish the existence of solutions of the problem. In particular we deal with the water wave equations with a logarithmic nonlinearity. We see the main theorem for the existence of solutions for this type of equations. Using an orthogonal base of the space, we search for an approximate solution and we prove the theorem.

Keywords: existence of solution; approximate solution; numerical-type of models; standard Galerkin method; water wave equation

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Minisymposium on Approximation Theory &Minisymposium on Math Education
3-6 July 2018, Istanbul, Turkey

Numerical Methods on Approximation of Solutions Using a Linear Operator

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We consider water wave equation. We use a linear combination and a linear operator to the solution of this equation. Using the Galerkin method we give the idea to approximate the solution with a polynomial on water wave equation. The polynomial satisfies the water wave equation using a set of parameters. Giving the exact solution and the approximation of solution we can compare the exact error.

Key words: Linear operator; approximate, solutions; water wave equation; linear parameters; Galerkin method

Connection between the Problem G-COL and the Problem GSIP

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This paper studies three classes of optimization problems with bilevel structure including the generalised col problem and the semi in_nite problem. Our work will be considered by using decoupling theorem.
Keywords: GSIP Problem, G-COL Problem, Bilevel Problem, Necessary Optimality Conditions, Decoupling theorem.

On the Finite Element Approximation of Elliptic QVIs with Noncoeicive Operators

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In this paper, we extend the approach developed in [1] for the standard finite element approximation in the .L6-norm of elliptic noncoercive variational inequalities (VI) to elliptic quasi-variational inequalities related to impulse control problems (QVI) [2]. Indeed, combining the Bensoussan-Lions Algorithm (BLA) and the concept of subsolutions for variational inequalities (VIs), we derive an error estimate between the continuous solution and its finite element counterpart and, also, for the first time, an error estimate between the continuous BLA and its discrete analog.

Keywords: Quasi-variational inequalities, Finite Element Approximation, Z-- Error Estimates

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3-6 July 2018, Istanbul, Turkey

Minimal Realization of Neutral Delay-Differential Systems

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In this paper, the problem of realization for linear delay-differential systems of neutral type is considered. The approach adopted is inuenced by results obtained in the context of systems over a commutative ring. For back ground on the problem of realization of linear systems over commutative rings, the reader should consult the references [1], [2] and [3]. For the case of delay-differential systems, Spong [4] has given some results on the realization of neutral systems from an algebraic approach. He used the concept of weak restricted system equivalence to obtain a two-step realization procedure for the construction of canonical neutral realizations for a large class of transfer functions. In the following, we will extend algorithms given in [4] to the neutral case, thus obtaining a direct procedure for the construction of a canonical realization for a large class of transfer functions.

Keywords: Delay-differential, Realization, Canonical.
Acknowledgement:The authors wish to express their thanks to Sultan Qaboos University (Oman) for their support in carrying out this research work.

Various types of approximation operators related to rough sets

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In this talk, we refer to several kinds of approximation operators which determine rough set structures of subsets of covering approximation spaces.Given a covering approximation space ($U;C$), several kinds of neighborhood systems on X(_ U) are established and studied to support rough set theory, digital geometry [2] and so on. Furthermore, we establish the corresponding topological spaces induced by these neighborhood systems on X(_ U) which can be used in digital geometry [1] and computer science.

Keywords: lower approximation operator, upper approximation operator, rough set

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3-6 July 2018, Istanbul, Turkey

Water Wave Equation Arising On Logarithmic Quantum Mechanics

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We introduce the model of equation that is closely related to the following equation (1.1). We study the global existence of week solution for this class of equation. Using the Gross logarithmic Sobolev inequality we establish the main theorem of existence of week solution for this class of equation arising from Logarithmic Quantum Mechanics. We can extend the results of [1, 2].

Keywords: logarithmic quantum mechanics; Gross-Sobolev inequality; logarithmic wave equation; global existence of solution; nonlinear effects.

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A Fractional Random Model for Influenza Transmission

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In this study, a fractional random differential equation system is constructed for modeling influenza transmission dynamics. A deterministic compartmental model of disease transmission is used to obtain the fractional random model with the addition of Riemann-Liouville fractional derivatives and random initial conditions with normal distribution. We investigate the results of the fractional random model and the deterministic model to compare these modeling approaches and comment on the randomness of disease transmission.

Keywords: Fractional Variational Iteration Method; Normal Distribution; Riemann-Liouville Fractional Derivative; Influenza

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3-6 July 2018, Istanbul, Turkey

An Epidemiological Model with Caputo Fractional Derivative and Normally Distributed Random Components

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A recent deterministic compartmental model is examined to analyze the transmission dynamics of Influenza. In this study we use Caputo fractional derivative in the model and also transform the initial values to Gaussian (Normal) distributed random variables to obtain a system of random fractional differential equations. Fractional Variational Iteration Method will be used to analyze the system and the comparison of fractional random and deterministic results will be used to interpret the advantages of the random modeling approach.

Keywords: Caputo Fractional Derivative; Influenza; Normal Distribution; Fractional Variational Iteration Method

Non-Perturbative Solution of a Free Convection Boundary Layer Flow over a Vertical Plate

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The aim of this study is to present, for the first time, a semi-analytic analysis of a free convection boundary layer flow over a vertical plate modeled by a system of nonlinear differential equations.

Keyword(s): Free Convection, Boundary Layer Flow, Non-perturbative solution

Türk ve İtalyan Öğrencilerin “Matematik Öğretmeni” Kavramına Yönelik Algılarının Metafor Analizi ile İncelenmesi

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Bu araştırmanın temel amacı Türk ve İtalyan öğrencilerin “matematik öğretmeni” kavramına ait algılarını metaforlar aracılığı ile incelemektir. Araştırmanın çalışma grubunu, aynı yaş grubundaki 167 Türk ve 112 İtalyan öğrenci olmak üzere toplamda 279 öğrenci oluşturmaktadır. Öğrencilerden “Matematik öğretmeni”nin onlar için ne anlama geldiğini açıklayan başka bir kavram kullanmaları ve nedenini açıklamaları istenmiştir. Bu maksatla araştırmanın verileri her öğrencinin “matematik öğretmeni………..gibidir; çünkü……………” cümlesini tamamlamalarıyla elde edilmiştir. Elde edilen verilerin analizi ve yorumlanmasında içerik analizi tekniği kullanılmıştır. Araştırmanın sonuçlarına göre öğrenciler toplam 255 geçerli metafor meydana getirmişlerdir. Bu metaforlar ortak özelliklerine göre 9 farklı kavramsal kategoriye ayrılmıştır. Analiz sonuçlarında Türk öğrencilerin, matematik öğretmeninin öğreticiliği üzerine metaforlar geliştirdikleri, İtalyan öğrencilerin ise matematik öğretmeninin kişilik özellikleri ile ilgili metaforlar geliştirdikleri sonucu elde edilmiştir. Ayrıca Türk erkek öğrencilerin, matematik öğretmeninin her daim destekçileri olduğu ile ilgili metaforlar da geliştirdikleri görülmüştür. Bu durum ile ilgili olarak kültürel faktörlerin etkisi olduğu sonucuna varılmıştır.

Keyword(s): Metafor, Matematik öğretmeni, Türk öğrenciler, İtalyan öğrenciler

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İlköğretim Matematik Öğretmen Adaylarının Öğretim Teknolojisi ve Materyal Tasarımı Dersine Yönelik Görüşleri ve Çeşitli Materyal Örnekleri

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Bu çalışmada ilköğretim matematik öğretmen adaylarının “Öğretim Teknolojileri ve Materyal Tasarımı” (ÖTMT) dersi hakkındaki görüşlerini belirlemek, materyal tasarlama sürecinin kendilerinde neleri geliştirdiğini düşündüklerine dair görüşlerini ortaya koymak, ayrıca kendi hazırlamış oldukları materyaller ile ilgili görüşlerini belirlemek amaçlanmaktadır. Bu nedenle çalışma ilişkisel tarama türünde betimsel bir araştırmadır. Verilerin analizinde, nitel araştırma tekniklerinden betimsel analiz ve içerik analizi teknikleri kullanılmıştır. Araştırmanın verileri ÖTMT dersini alan toplam 88 ilköğretim matematik öğretmenliği öğrencisine uygulanan “Öğretim Teknolojileri ve Materyal Tasarımı Dersi Değerlendirme Formu”ndan elde edilmiştir. Araştırma sonucunda ilköğretim matematik öğretmen adaylarının, ÖTMT dersinin kendilerinde öğretmenlik mesleği ile ilgili tecrübe kazandırdığını belirttikleri ve materyal tasarlama sürecinin yaratıcı düşünme becerilerini geliştirdiğini düşündükleri ortaya çıkmıştır. Ayrıca öğretmen adaylarının kendi hazırlamış oldukları materyalleri sınıf ortamında sunmalarının hem kendi mesleki gelişimleri hem de onları dinleyen öğretmen adaylarının farklı materyal ve uygulamalar ile karşı karşıya kalmalarından dolayı mesleki gelişimlerine katkı sağladığı, bu nedenle bu tür uygulamaların devam etmesinin önemli olduğu düşünülmektedir.

Keyword(s): Materyal tasarımı, İlköğretim matematik öğretmen adayları, Öğretim teknolojileri ve materyal tasarımı dersi

Playing with Continued Radicals and Iterated Exponents

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In real analysis and number theory courses, the study of the Continued or Nested Radicals and Continued Fractions and Iterated Exponents are very popular and interesting subjects. In this talk, we will present some interesting notes on the calculation of the values of the continued radicals and iterated exponents with integer elements and integer values by using splitting of the integers under the radicals in a certain ways which are very bizarre and interesting approaches. Since the time of the lecture is short I promise to manage the time and present theorems without proofs. That will change my presentation from theoretical approach lecture to a fun and amusement type of lecture. But, I will submit a more detailed paper on this subject for publication and you can have the full published paper after our conference. Yes, this talk is for general audiences and it is easily understandable to even high school and undergraduate students. Come and join us and enjoy by playing with radicals. Let's prove that MATH is ENJOIABLE, SWEET and FUN.

Keywords: Continued Radicals, Continued Exponents.

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3-6 July 2018, Istanbul, Turkey

Gaussian Associated Pell Numbers

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In this study, we first define the sequence of the Gaussian associated Pell numbers. Then, we give the recurrence relation and the Binet formula for the sequence of Gaussian associated Pell numbers. Moreover, we obtain some identities involving Gaussian associated Pell numbers.

Keywords: Gaussian associated Pell numbers, Recurrence relation,Binet formula

Some Results on the Sequence of Lucas-balancing Numbers

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Let B_n bethe n-th balancing number, then it is well known that $8B_n^2+1$ is a perfect square. The square root of this number occurs in the nonlinear recurrence relations for balancing numbers, frequently. This number is called n-th Lucas-balancing number. Lucas-balancing numbers are associated with balancing numbers, in the way Lucas numbers are associated with Fibonacci numbers. In this study, some algebraic relationson the sequence of Lucas-balancing numbers and its relationships with the other integer sequences are investigated.

Keywords: Lucas-balancing numbers, balancing numbers,recurrence relation

Bulanık Theta-Ön-I-Sürekli Fonksiyonların Kuvvetli Formu

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Son yıllarda, ideal topoloji ve bulanık topoloji ile ilgili topolojik kavramlar arasında pek çok bağlantılar elde edilmiştir. Bu çalışmada, bulanık kuvvetli theta -ön-I- sürekli fonksiyonlar olarak adlandırılan fonksiyonların yeni bir sınıfını sunduk. Bu fonksiyonun bir çok karakterizasyonlarını ve bazı özelliklerini elde ettik. Ayrıca diğer fonksiyon türleri ile bağlantısını inceledik.

Anahtar Kelimeler. bulanık kuvvetli theta-ön-I-sürekli fonksiyonlar, bulanık zayıf ön-I-sürekli fonksiyonlar, bulanık I-lokal olarak kapalı, bulanık ön-theta-I-açık.

On Mighty Form of a Sort Of Fuzzy Multifunctions

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In this study, we expand the concept of strongly θ-pre-continuous multifunction to fuzzy topology and discuss its characterizations. Also, the definitions of fuzzy strong θ-continuous multifunction, fuzzy pre continuous multifunction, fuzzy continuous multifunction are given by the relevant authors and the relationships of fuzzy strongly θ-pre-continuous multifunction with these types of fuzzy multivalued maps are also investigated and obtained a diagram. Moreover, properties of this function about restriction mutlifunction, graph multifunction, composite multifunction are discussed on some fuzzy spaces and product spaces.

Keywords: fuzzy continuous multifunction, fuzzy strongly θ-pre-continuous multifunction, fuzzy pre-θ−open sets.

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Properties of Fuzzy Slightly Θ-Pre Continuous Multifunction

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In this document, we define the weak form of fuzzy strongly θ-precontinuity. We discuss its relationships with fuzzy strong θ-precontinuity and fuzzy almost weak continuity. Also, it is shown that fuzzy weak θ-precontinuity is independent of weak continuity. Additionally, we determine conditions under which fuzzy weak θ-precontuniuty and fuzzy weak continuity are related to each other.

Keywords. Fuzzy topology, fuzzy weak θ-precontinuity fuzzy almost weak continuity, fuzzy strongly θ-precontinuity, fuzzy weak continuity, fuzzy strongly θ-continuity, fuzzy precontinuity.

A Weak Class Of Some Contınuity in Fuzzy Ideal Topological Space

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In this paper, we obtain several characterizations of fuzzy weakly θ pre-I-continuous functions . It is shown that weak pre-θ-I-continuous functions are certainly weaker than strong θ -continuous functions. In addition, the features of these functions are investigated.

Keyword(s): fuzzy weakly θ pre-I-continuous functions, fuzzy contra θ pre-I-continuous functions, fuzzy pre-I-θ-closed functions.

Certain positive linear operators with better approximation properties

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The present paper deals with the modified U_n^ρ operators that present a better degree of approximation than the original ones. These operators depend on a certain function τ defined on $[0,1]$ continuously differentiable ∞ times, such that $\tau(0) = 0, \tau(1) = 1$ and $\tau(x) > 0$ for $x \in [0,1]$. Using the first order Ditzian-Totik modulus of smoothness, some Voronovskaja type theorems in quantitative mean are proved. By numerical examples we show that depending on the choice of the function τ, the modified operator presents a better order of approximation than the classical ones.

Keyword(s): Voronovskaja type theore, Ditzian-Totik modulus of smoothness, linear positive operators

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Some approximation properties by a class of bivariate operators

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In this paper, we introduce a bivariate generalization of a modified Bernstein operators and get a Bohmann-Korovkin type approximation theorem of the considered operators. Some estimates of the rate of convergence using the proposed operators are considered and a Voronovskaya theorem is also presented. In the last section, the Generalized Boolean Sum (GBS) version of the proposed operators is also introduced in the Bögel space of continuous functions, in order to obtain better approximation properties comparing with the classical one. The paper contains also numerical considerations on the constructed operators based on Maple algorithms.

Keyword(s): Complete modulus of continuity, Bernstein operators, B-continuous functions, B-diferentiable functions.

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Approximation by certain positive linear operators

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In a recent paper, Khosravian-Arab et al. [1] have introduced a modified Bernstein operators to improve the degree of approximation as follows:

$$B_n^{M,1}(f,x)=\sum_{k=0}^{n} p_{n,k}^{M,1}(x) f\left(\frac{k}{n}\right), x\in[0,1],$$

$p_{n,k}^{M,1}(x)=\alpha(x,n)p_{n-1,k}(x)+\alpha(1-x,n)p_{n-1,k-1}(x),\ 1\leq k\leq n-1,$
$p_{n,0}^{M,1}(x)=\alpha(x,n)(1-x)^{n-1},\quad p_{n,n}^{M,1}(x)=\alpha(1-x,n)x^{n-1},$
$p_{n,k}(x)=\binom{n}{k}x^k(1-x)^{n-k},$
and $\alpha(x,n)=\alpha_1(n)x+\alpha_0(n), n=0,1,\cdots,$
Motivated by the above result, the main object of this paper is to construct new positive linear operators which have better features than the classical ones. Some direct estimates for the modified operators by means of the first and second modulus of continuity are given. Some numerical examples with illustrative graphics have been added to validate the theoretical results and also compare the rate of convergence.

Keyword(s): modulus of continuity, Voronovskaja type theorem, rate of convergence
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Energy of Shallow Water Wave and C-H equation on Lagrangian Coordinates

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We deal with the Camassa-Holm equation possesses a global continuous semigroup of weak conservative solutions for initial data in . The result is obtained by introducing a coordinate transformation into Lagrangian coordinates. To characterize conservative solutions it is necessary to include the energy density given by the positive Radon measure μ with . The total energy is preserved by the solution.

Key words: weak solutions; Camassa-Holm equation; Radon measure; energy density; global existence of solution; total energy.

A study of certain subclass of Harmonic Univalent functions of Bazilevi´c type related to new derivative operator

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The aim of the present paper is to introduce and investigate certain subclass of Bazilevi´c type harmonic univalent functions involving a new linear operator. Also, we obtain the harmonic structures in terms of its coefficient bounds, extreme points, distortion bound, convolution and show that the function in this class is closed under an integral operator.

Keyword(s): Univalent function, Bazilevic function, Harmonic mapping,

Some Problems in Approximation by Linear Positive Operators

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The purpose of present paper is to extend the study of **λ**-Bernstein operators introduce by Q.B. Cai, B.Y. Lian and G. Zhou in 2018. In our paper we consider a generalization of the U^{ρ}_{n} operators introduced in 2007 by Radu Paltanea, using the new Bernstein-Bézier bases $\tilde{b}_{n,k}(\lambda, x)$ with shape parameter **λ**. Some approximation properties are given, including local approximation, error estimation in terms of moduli of continuity and Voronovskaja-type asymptotic formulas. Finally, we give some graphs and numerical examples to put in evidence the convergence of U^{ρ}_{n} (f;x) to f(x).

Keyword(s): λ-Bernstein operators, U^{ρ}_{n} operators, moduli of continuity, rate of convergence, Voronovskaya type theorem

AMS Subject classification : 41A10; 41A36

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Solvability of Nonlinear Fractional Differential Equations with Nonlocal and Integral Conditions

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In this paper, we will study a nonlinear fractional differential equation of order p in (2,3] with nonlocal and integral boundary conditions. Some existence and uniqueness results will be presented by applying some fixed point theorems.

Keyword(s): Fractional differential equation, Fixed point theorems. Nonlocal boundary condition , Integral boundary condition.

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Some new quantum codes over nonbinary fields

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The relationship between quantum information and classical information is a subject currently receiving much study. One of the first very important results how to use the quantum effects for computing was given by P.Shor [3] (he proved that a given integer can be factorized in polynomial time on a quantum computer). Quantum information can be protected by quantum error-correcting codes (QECCs). As it is too difficult to construct good quantum codes in general, simpler constructions can be considered.

The problem of finding good QECCs can be transformed into the problem of finding classical linear self-orthogonal codes over the finite field $\boldsymbol{F_q}$. In our work we use the Calderbank-Shor-Steane (CSS) quantum code construction [2]: if there exists a classical linear $[n, k, d]_q$ code C such that $C^{\perp}$ (the orthogonal code of C) is a subset of C, then there exists an $[[n, 2k - n, \geq d]]_q$ quantum code that is pure to d.

Using the CSS construction method, we construct self-orthogonal codes over $\boldsymbol{F_3}$ and we obtain new quantum codes with the following parameters: $[[18, 6, 4]]_3$, $[[24, 0, 9]]_3$, $[[27, 15, 4]]_3$, $[[28, 20, 3]]_3$, $[[30, 22, 3]]_3$, and $[[32, 24, 3]]_3$. Also, we construct some self-orthogonal codes over $\boldsymbol{F_5}$ that meet the bounds for the best known quantum codes for $q = 5$. All computer calculations in this work were performed by Q-Extension [1].

Keyword(s): quantum code, linear code, self-orthogonal code

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Blow-up behavior of the Solution for the problem in a subdiffusive medium

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The diffusion problem in a subdiffusive medium is formulated by using the fractional differential operator. In this paper, we consider a fractional differential equation with concentrated source. The existence of the solution in a finite time is given. The finite time blow-up criteria for the solution of the problem is given and the location of the blow-up point is investigated.

Keyword(s): Blow-up, subdiffusive medium, concentrated source

Degenerate Genocchi Numbers Arising From Ordinary Differential Equations

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Dolgy *et al.* investigated the modified degenerate Bernoulli polynomials. Kim *et al*. introduced and investigated the degenerate Bernoulli numbers and polynomials and the degenerate Euler numbers and polynomials. Carlitz defined the degenerate Bernoulli numbers and degenerate Euler numbers. Lin prove some identities for higher order the degenerate Genocchi polynomials. Young gave a symmetric identity for the degenerate Bernoulli polynomials.

In this paper, we give some differential equation. Also, we prove the symmetric relation for the degenerate Genocchi polynomials

Keyword(s): Genocchi Polynomials and Numbers, Euler Polynomials and Numbers, Degenerate Genocchi Polynomials and Numbers

A Note on the Degenerate Bernoulli Polynomials and Degenerate Euler Polynomials

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Carlitz was the first to extend the classical Bernoulli polynomials, Euler polynomials and numbers, introducing them as q-Bernoulli and q-Euler numbers and polynomials. He introduced degenerate Bernoulli polynomials. Dolgy *et al.* defined and investigated the modified degenerate Bernoulli polynomials. Kim *et al.* and Kwon *et al.* proved some identities and recurrence relations. Kim *et al.* gave some explicit relation degenerate Bernoulli polynomials associated with p-adic invariant integral Z_p. Young gave a symmetric identity for the degenerate Bernoulli polynomials.
In this work, we give some symmetric relations for the degenerate Bernoulli polynomials and the Euler polynomials. Also, we prove some identities between these polynomials. Further, we prove some relations between the degenerate Bernoulli polynomials and the degenerate second kind Stirling numbers of first kind.

Keyword(s): Bernoulli Polynomials and Numbers, Euler Polynomials and Numbers, Degenerate Bernoulli polynomials,

Iterates of Positive Linear Operators and Related Convergence Problems

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More recently, a renewed interest is grew out on the study of iterates of positive linear operators in approximation theory and related fields. Iterates of a single linear operator are connected with ergodic theory and, in particular, with ergodic theorems. Furthermore, they are also related to the theory of strongly continuous semigroups of operators and, in particular, on their asymptotic behaviour which, among other things, gives useful information about the large time behaviour of the solutions to the Cauchy problems governed by them.

The talk will be devoted to discuss some recent results related to these topics. In particular, a characterization of the convergence of the iterates of a Markov operator toward a given Markov projection will be discussed in terms of the involved interpolation sets.

The usefulness of the approximation of strongly continuous semigroups of operators in terms of iterate will be enlightened by also showing a simple criterion under which positive semigroups admit a unique invariant probability measure which also determines their limit behavior.

Applications will be showed concerning Bernstein-Schnabl operators on convex compact sets and Bernstein-Durrmeyer operators with Jacobi weights on hypercubes.

Keywords: Iterate of operators, semigroup of operators, Bernstein-Schnabl operator, Bernstein-Durrmeyer operator.

Complements to Voronovskaja's Formula

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Voronovskaja type formulas are usually established for sequences of positive linear operators. They are important tools in Approximation Theory, used in order to investigate the rate of convergence and saturation properties. The investigation of Voronovskaja type formulas for the composition of two linear operators acting on an arbitrary Banach space was initiated in [2]. In our talk we present generalizations of the results in [2] (see [1]).

Keyword(s): Voronovskaja type formula, composition of operators

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Diophantine approximation with improvement due to the Farey series

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In this work we proof the following theorem which is, in addition to some other lemmas, our main results.

Theorem Let $X = \{(x_1, t_1), (x_2, t_2), ..., (x_n, t_n)\}$ be a finite part of $R \times R^{*+}$ then there exists $0 < \varepsilon_0$ such that if $0 < \varepsilon \leq \varepsilon_0$ then there exist a rational numbers $\left(\frac{p_i}{Q}\right)_{i=1,2,\ldots n}$ satisfying

$$\begin{cases} \left| x_i - \frac{p_i}{Q} \right| \leq \varepsilon t_i \\ \varepsilon Q \leq t_i \end{cases}, \; i = 1,2,..., n.$$

It is clear that the condition $\varepsilon Q \leq t_i$ for $i = 1,2,..., n$ is equivalent to $\varepsilon Q \leq t = \underset{i=1,2,\ldots n}{Min} \; t_i$.

Keyword(s): Nonstandard analysis, diophantine approximation, Farey series.

Explicit limit cycles of a family of polynomial differential systems

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In this work, we consider the family of the polynomial differential system of the form

$$x' = x + (\alpha y - \beta x)\left(ax^2 - bxy + ay^2\right)^n,$$
$$y' = y - (\alpha x + \beta y)\left(ax^2 - bxy + ay^2\right)^n,$$

where a, b, α, β are real constants and n is positive integer.

We prove that these systems are Liouville integrable. Moreover, we determine sufficient conditions for a polynomial differential system to possess an explicit algebraic or non-algebraic limit cycles. Concrete examples exhibiting the applicability of our result are introduced.

Keyword(s): Planar polynomial differential system; First integral; Limit cycle.

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An extention of the Fuglede-Putnam theorem

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Let B(H) be the algebra of all bounded linear operators acting on a complex separable and infinite dimensional Hilbert space H. For any two operators A,B ∈ B(H), we say that the operators A,B satisfy the Fuglede-Putnam theorem if AX=XB for some operator X ∈ B(H) implies that A^*X=XB^*. The main objective of this peper is to give an extention of this theorem for a large class of operators.

Keywords: derivation, orthogonality, Fuglede-Putnam theorem.

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Orthogonality of the range to the kernel of generalized derivation

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Let L(H) denotes the algebra of all bounded linear operators on a complex and infinite dimensional Hilbert space H. For A,B $\in$ L(H), we define the generalized derivation $\delta_{A,B}$ induced by operators A and B by:

$$\delta_{A,B}:L(H)\to L(H);X\mapsto AX-XB$$

Given subspaces M and N of a Hilbert space H with norm $\|.\|$; M is said to be orthogonal to N if $\|m+n\| \geq \|n\|$ for all m $\in$ M and n $\in$ N. The purpose of this work is to find the operators A,B $\in$ L(H) which satisfies: $\|AX-XB+S\|\geq\|S\|$, for S $\in$ L(H) such that AS=SB.

Keywords: generalized derivation, orthogonality, Fuglede-Putnam theorem.

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Existence theorems and weighted pseudo almost periodic solutions of a generalized Volterra equation

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Three fixed point theorems: Banach, Krasnosel'skii, and Krasnosel'skii-Schaefer will be used in this paper in order to establish the existence of weighted pseudo almost periodic solutions of a class of Volterra equation:

$$x'(t) = f(t, x(t), x(t-\tau(t))) + \int_t^{+\infty} K(t,s)g\big(s, u(s)\big)ds,$$

Notice that the latter theorem is a combination of Krasnosel'skii theorem and Schaefer fixed point theorem.

Keyword(s): Weighted pseudo almost periodic, fixed point theorems, Volterra- equation.

Weighted pseudo almost periodic solution of a class of Impulsive differential equations with delays and time scales

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As we all know many evolution process in nature are identifyed by the fact that at certain moments of time they experience an abrupt change of state. This has been the main reason for the development of the new branch of the theory of ordinary differential equations called impulsive differential equations in recent years. Moreover, such equations represent a natural framework for mathematical modeling of several real world phenomena. in physics, population dynamics, ecology, biological systems, biotechnology, industrial robotics, pharmacokinetics, optimal control...

Basically, impulsive differential equations consist of three components: a continuous-time differential equation, which governs the state of the system between impulses, an impulse equation, which models an impulsive jump, defined by a jump function at the instant an impulse occurs and a jump criterion, which defines a set of jump events.

The main objective of this paper is to provide a sufficient condition to get the existence of the weighted pseudo almost periodic solution for equations of the form

$$u'(t) + A(t)u(t) = F(t,u) + H(t,u(t+\tau) + \sum_{k=-\infty}^{\infty} G_k \ (u)\delta\big(t-\tau_k\ \big)$$

Keyword(s): Weigthed pseudo almost periodic, differential equations, impulsion,

Generalized local Morrey spaces and multilinear commutators generated by Marcinkiewicz integrals with rough kernel associated with Schrödinger operators and local Campanato functions

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Let $L = -\Delta + V(x)$ be a Schrödinger operator, where Δ is the Laplacian on $\mathbb{R}^n$, while nonnegative potential $V(x)$ belongs to the reverse Hölder class. In this paper, we consider the behavior of multilinear commutators of Marcinkiewicz integrals with rough kernel associated with Schrödinger operators on generalized local Morrey spaces.

Keyword(s): Marcinkiewicz operator; rough kernel; Schrödinger operator; generalized local Morrey space; multilinear commutator; local Campanato space.

Semi-classical Analysis for the Long Wave-Short Wave Interaction Equations

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In this talk, we present the semi-classical analysis of the long wave-short wave interaction (LSI) equations. For this aim, we apply WKB approximation for LSI equations. The associated hydrodynamical structure and local conservation laws are obtained. We represent the LSI equations as a linear dispersive perturbation of a symmetric quasilinear hyperbolic system. The local existence and uniqueness of the smooth solutions of the LSI equations are obtained and its semi-classical limit is also derived by employing the classical quasilinear hyperbolic system theory.

Keyword(s): Semi-classical limit, WKB approximation, Long wave-short wave interaction equations

Existence and Non-existence of Global Solutions for the Higher Order Boussinesq Equation

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In this talk, we present the initial and boundary value problem for the higher order Boussinesq equation. The existence of a local and global solution are proved. The sufficient conditions for finite time blow-up solutions are provided by using the concavity method.

Keyword(s): The initial and boundary value problem, The higher order Boussinesq equation, Blow-up

Using Mathieu Equation in Relativistic 2D Non-Pure Dipole System

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We study the Klein-Gordon and the Dirac equations for 2D systems where we have a non-pure dipole interaction between a centre of charges without radial symmetry. We study both spin and anti-spin symmetry cases. This model in the simplest non-central potential and results from the addition of the effects of a Coulomb and an angular electric dipole potential. We use the Mathieu equation to solve the angular part of the quantum system and the Kummer equation to solve the radial one. We write the Eigen functions and the energies according to the Mathieu characteristic values. We apply our study to both electronic and muonic systems.

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Geometrical and numerical approach to solve transonic gas equation

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In this paper, the transonic gas equation will be considered. Different methods will be presented and discussed. We will show that there is no unique solution in the computational domain $[-1; 1]^2$ with Dirichlet boundary conditions.

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Non-Pure Dipole for Schrodinger Equations in 2D Systems

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We study the Schrodinger equation for a 2D system where we have a non-pure dipole interaction between a centre of charges without radial symmetry and point charge. This model in the simplest non-central potential and results from the addition of the effects of a Coulomb and both a radial and an angular electric dipole potential. We use the Mathieu equation to solve the quantum system and study its behaviour according to the ratio between the two dipole moments (the radial and the angular one).

Spacelike and Timelike Structure Equations and Constraint Manifolds on Lorentz Plane

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Computing the structure equation of a mechanism gives some information about the motion of this mechanism. What's more, the structure equation assists to obtain the constraint manifold of the mechanism. The constraint manifold satisfies to make geometric comments about the form which is attained. Additionally, the constraint imposed on the positions of the end link in the mechanism is presented by the manifold. In this paper, the structure equations of a planar open chain are calculated in terms of the causal character of the first link in Lorentz space. Then, these structure equations are used to get the constraint manifolds of the chain with regard to the causal characters. The geometric comments about these manifolds are remarked.

Keyword(s): Planar Open Chain, Constraint Manifold, Structure Equation.

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Measure pseudo almost automorphic solutions for some evolution equation

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The aim of this work is to study the new concept of the (μ, ν)-pseudo almost automorphic functions for some non-autonomous differential equations. We suppose that the linear part has an exponential dichotomy. The nonlinear part is assumed to be (μ, ν)-pseudo almost automorphic. We show some results regarding the completness and the invariance of the space consisting in (μ, ν)-pseudo almost automorphic functions. Then we propose to study the existence of (μ, ν)-pseudo almost automorphic solutions for some differential equations involving reflection of the argument.

Keyword(s): Measure pseudo almost automorphic function; exponential dichotomy; ergodicity.

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Mathematical Risk Assessment Model to Assess the Occurrence of Each Event of Risks of Fire and Explosions of Pipelines

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Oil and gas are the main sources of energy and fuel thathave been used since the early times. Most hydrocarbons are transported from a location to another through pipelines.

Existing Pipelines worldwide have been subjected to deterioratiodue to aging; aggressive environmental factors, thedesign, and inadequate maintenance . To ensure optimal performance, this often requires extensive maintenance,repair, and renewal of practices or even the replacement ofsome components.

Therefore, in the work in hand,we attempt to shed the light on the ways of developing a method for the evaluation of risks of fire and explosions of pipelines. The causes of the latter and consequences are, inone hand, analyzed by means of fault tree and bow tie methods. On the other hand, a quantitative analysis implementing the Bayesian networks is used to estimate the probabilityof occurrence of the adverse event. Moreover, 72 basic events were found to be of the primary causes provoking the occurrence of undesirable events. However, some expert soften find it difficult to precisely determine the probabilities of occurrence of basic events of the tree.

For the purpose of evaluating the occurrence of each basic event, we used the fuzzy logic. Hence, at the end of the study, we were able todevelop a model that could help us evaluate the risks accompanied the fires and pipelines explosion as well as the consequences.

Keywords: fuzzy logic- mathematical risk - evaluation –occurrence

A Mathematical Model for the Detection of Isolation State Faults of Electrical Networks (Arcelor Mittal Lake)

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These last are considered like one « silent enemy », in the sense where they lead, once started and if some cautiously have not taken in preliminary, to default of system in which they develop. While considering of stresses more and more severe to operating on device and systems of electrical engineering (electrotechnical or power electronic) their existence is more and more actually. The subject of this work is to remind what are these unload and, by some concrete exemples, to present some methods of mesure (principle and limitation) and the tools of diagnostic which while follows. The geometrical shapes knowledge of the circuit breaker plays a fundamental role in determining the electric field. The problem is then to act on the arc and its dynamics in order to accelerate its extinction, and thus improve the quality of the power interruption. Unfortunately, the electric arc has explosive properties (phenomenon fast and unstable) and destructive to the device. Many physical laws (mechanics of fluids, electromagnetism), intervene and complicate attempts to improve the circuit breakers on the limitation of short-circuit fast extinction of the arc, increase in the number of operation. For that and starting from the magnetic diagnostics, we must conduct.

The arc characteristics play an important role in the flashover process, particularly an arc's voltage-current characteristics. To understand the mechanisms underlying the flashover phenomenon on an ice-covered insulator at high altitudes, it is necessary to investigate how local arc characteristics vary under low pressure.

Keywords: machine turning voltage, converter, module of power, partials unload

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Solving Local Fractional Fredholm Integral Equation of the Second Kind With Separable Kernel

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The local fractional integral equations are one of the applications on local fractional calculus, this work study the local fractional fredholm integral equation of the second kind

$$u(x) = f(x) + \frac{\lambda^\alpha}{\Gamma(1+\alpha)} \int_a^b k(x,t) u(t) (dt)^\alpha$$

where the function $k(x,t)$ is called the kernel of the local fractional fredholm integral equation, $f(x)$ is a local fractional continuous function, λ^α is a parameter, the limits of integration a and b are constants and the unknown function $u(x)$ can be appears linearly under the integral sign.

In this work, we will deal with separable kernel, that's mean the kernel $k(x,t)$ can be expressed as a sum of finite numbers of terms each of which is a product of a function of x only and a function of t only

$$k(x,t) = \sum_{i=1}^{n} f_i(x) g_i(t)$$

and then solve the local fractional fredholm integral equation of the second kind with separable kernel by following a certain procedure, we will obtain a system of linear equations that can be used to solve the local fractional fredholm integral equation, also the work displays examples that show the effectiveness of this method.

Keywords: local fractional calculus, local fractional fredholm integral equation, separable kernel

A Numerical Treatment of an El Nino Southern Oscillation Model

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In this study, a nonlinear El Nino Southern Oscillation (ENSO) model is considered to obtain approximate solution and the solution founded compared with the existence ones.

Keyword(s): ENSO Model, Approximate Solution, Non-perturbative solution

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Design and Development an Expert System for Diagnostics of Maintenance

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Increasing the performance of production units becomes a complex task from the technical point of view, especially when it comes to ensuring the availability and continuity of production systems where maintenance plays a fundamental role, it consists of checking and ensuring permanent monitoring of the installations of these systems. This operation requires continuous and high-level training of the operators, in order to overcome this limit, we call upon the field of artificial intelligence and expert systems. The basic idea of this work is the study of the contribution of expert systems in maintenance. It is a matter of synthesizing, from a bibliographic study, a logic allowing to integrate the expert systems of diagnosis of breakdowns and dysfunctions in the maintenance of the systems of production; this last, this expert systems give the better performance concerning the settling time and decision support.

Keywords: Expert Systems, AMDEC, Diagnosis, Maintenance, Decision Support.

Elliptic System with Weights Involving Critical Sobolev Exponent

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This talk is devoted to the existence and nonexistence of positive solutions for a semilinear elliptic system involving critical Sobolev exponent and weights. We study the effect of the behavior of weights near their minima on the existence of solutions for the considered problem.

Keywords: Critical Sobolev exponents- Palais-Smale condition- semilinear elliptic system

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Diophantine approximation with improvement due to the Farey series

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In this work we proof the following theorem which is, in addition to some other lemmas, our main results.

Theorem Let $X = \{(x_1, t_1), (x_2, t_2), ..., (x_n, t_n)\}$ be a finite part of $R \times R^{*+}$ then there exists $0 < \varepsilon_0$ such that if $0 < \varepsilon \leqq \varepsilon_0$ then there exist a rational numbers $\left(\frac{p_i}{Q}\right)_{i=1,2,\ldots n}$ satisfying

$$\begin{cases} \left| x_i - \frac{p_i}{Q} \right| \leqq \varepsilon t_i \\ \varepsilon Q \leqq t_i \end{cases}, \; i = 1,2,..., n.$$

It is clear that the condition $\varepsilon Q \leqq t_i$ for $i = 1,2,..., n$ is equivalent to $\varepsilon Q \leqq t = \underset{i=1,2,\ldots n}{Min} \; t_i$.

Keyword(s): Nonstandard analysis, diophantine approximation, Farey series.

Solvability of the fractional Volterra-Fredholm integro differential equation by HDG method

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In this work, the existence and uniqueness of the fractional Volterra- Fredholm integro differential equation (VFIDE) corresponding to the hybridizable discontinuous Galerkin (HDG) method are investigated. The method, based on local solvers and transmission condition, is applied to the VFIDE using three auxiliary variables. This form is more amenable to obtain the solvability criterias of the equation. Also, this results in a tridiagonal, symmetric, and positive definite stiffness matrix which is very easy to solve.

Keyword(s): Hybridizable discontinuous Galerkin method, Volterra-Fredholm integro differential equation, boundary value problem

Differential diagnosis of cerebral toxoplasmosis: ANN analysis of MRI images

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Cerebral toxoplasmosis as a clinical manifestation related to infection with the parasite Toxoplasma gondii is most often related to the endogenous reactivation of parasitic cysts present in the central nervous system. The target population is usually those with immunodeficiency, immuno-compromised or transplant recipients including marrow. Clinical signs may include loss of consciousness, intracranial hypertension, disturbances of alertness, nausea and vomiting. Although magnetic resonance imaging (*MRI*) is essential for its accuracy in the size, number and limits of cysts, it remains non-specific. The diagnosis of multiple abscess brain lesions should induce a differential diagnosis. The pathologies to be considered may be infection, or tumor (cerebral lymphoma of a solid tumor). In order to analyze the various factors related to the diagnosis, we propose to analyze them using an Artificial Neural Networks (ANN) system. Neural networks are interconnected networks connecting two input and output spaces. Given the complexity of the system to be analyzed, the neural networks are well adapted. From the disease data, the network is constructed with input space that includes all of the intrinsic and environmental probable causes as well as the obtained MRI image. The analysis makes it possible to extract the output variable in terms of confirmation of the toxoplasmosis, infectious, or tumoral nature. This is the result of the transfer function between the two spaces built during the learning phase of the network.

Keywords. Toxoplasmosis, abscess, tumor, brain, MRI, ANN

Atmospheric Pollutant Flow and Precipitation: Modeling Effects on the Vegetation Ecosystem

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Because of their fixed life and wide distribution, plants are the first victims of air pollution. The atmosphere is considered polluted when the increase of the rate of certain components causes harmful effects on the different constituents of the ecosystems. The study of the flow of air near a polluting source (cement plant in our case), allows to predict its impact on the surrounding plant ecosystem. Different factors are to be considered. The chemical composition of the air, the climatic conditions, the impacted plant species are complex parameters to be analyzed by conventional mathematical methods. In this study, we propose a system based on artificial neural networks. Neural networks are designed to mimic the performance of the human brain. There is inputs level, output level, and a variable number of internal (or hidden) layers. The inputs are connected to hidden layer and they are in turn connected to output. As the neural network learns from a data set, the connection weights are adjusted. Data are fed into the input nodes, processed through the hidden layer(s), and the connection weights to the output nodes are adjusted. Artificial neural networks possess the ability to model complex systems. Their application is well adapted to these problems. A learning phase of the network is carried out on half the analyzed variables. The other half is used for network testing. A system is constructed with input variables (chemical composition, climatic conditions, and plant species) and an output variable that expresses the offending species. Climatic conditions include a set of variables such as temperature, precipitation, wind speeds, and atmospheric pressures. Each variable is numerically coded in three levels (1,2,3).
After the learning phase of the network, it becomes possible to predict the result at the output of the system from the input of the variables at the input. As the effect of each parameter is supported as weight (mathematical coefficient) when adjusting the function, the result will be as accurate as possible.The proposed system will then make it possible to predict the nature of the species that survive under the conditions of the parameters fixed at the input of the system.

Keywords. Air pollution, Precipitation, Atmosphere, Artificial neural networks

Viral infections and cancers: Intelligent analysis

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Several viral infections cause different types of cancer. The proportions vary from one type of infection to another. The main viruses causing these infections are (*Helicobacter pylori*, human papilloma virus, hepatitis B virus, hepatitis C virus, Epstein-Barr virus). However, the distribution of these cancers whose origin is a viral infection varies according to several factors. The socio-economic level of the target population that appears from the geographical distribution, gender and age are very distinctive. In order to establish an action plan for the prevention and fight against these cancers, it is essential to identify the causes. Carcinogenic biological agents have been identified, transmission routes have been discovered. However, to implement a vaccination campaign, for example, it is necessary to have a reliable analysis tool to target the population concerned. In this study, a tool for the analysis of variables relating to infection and thus to cancer is established. Given the complexity of the system, the techniques of artificial intelligence are proposed. A fuzzy logic system addresses these uncertainties and complexity. In addition to known factors, whatever the weight of each is ignored, other factors are totally unknown and have their effects. The proposed system is four inputs (viral strain, sex, age, socioeconomic level) and an output variable that expresses the degree of involvement of a cancer-derived viral infection. A rule base is done from real data recording by the International Agency for Research on Cancer (GLOBCAN). When the base of the rules encompasses all possible combinations, it is easy to randomly enter data at the inputs to instantly read the prediction of impairment by these cancers.

Keywords. Virus, infection, cancer, fuzzy logic

Mammography utility analysis

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The goal of mammography screening is to detect small cancerous foci in the breast. However, current imaging and analysis techniques do not distinguish between cancer cells that will progress to breast cancer. Indeed, we all have cancer cells in our body. These cells disappear on their own most of the time. In most cases, there is no lymph node involvement or metastases. Studies show that only 5/10,000 women regularly examined for 10 years are diagnosed with cancer and that 52% of cancers diagnosed by mammography are over diagnosed. American, Swedish, and Norwegian studies show that only half of the cancers detected by mammography would have disappeared on their own. In order to avoid the dramatic consequences for these women who often manifest themselves by lumpectomy, radiotherapy, mastectomy and chemotherapy, this study proposes to associate prognosis with other risk factors for breast cancer. Indeed, age, personal history of the disease, family history, hormonal treatments, smoking, and alcohol, overweight or physical activity should be considered. Since these factors are complex to analyze using conventional mathematical tools, an intelligent system with fuzzy logic is proposed. The fuzzy logic deals uncertainty and imprecision, its application in this area is adequate. The constructed system is five input variables (mammography outcome, age, factors of consumption, genetic factors, physical activity and obesity) and an output variable that expresses the degree of confidence in the outcome of the mammogram. A database is built and from which it will be possible to randomly introduce variables to the input to instantly read the result at the output. This tool can be used as a decision aid to follow in the case of suspicion of breast cancer.

Keywords. Brest cancer, mammography, risk factors, fuzzy logic

Pre-Service Mathematics Teachers' Views towards Design-Based Learning

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In this research, it was aimed to examine the views of pre-service mathematics teachers towards design based learning. The study group of the study is composed of 30 pre-service primary teachers. This study, which is conducted as case study design, was completed in 10 weeks (3 hours per week) in spring semester of 2017-2018 academic year. "Design Based Learning Interview Form" developed by researcher was used as data collection tool. The obtained data were analyzed according to the content analysis steps. As a result of design-based learning practices, it has been determined that pre-service mathematics teachers had changed their opinions towards design based learning practices and about engineers and design. They pointed out that it is important for the pre-service teachers to use design-based learning practices in their lessons.

Keyword(s): Mathematics, Design Based Learning, Teachers

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Numerical Simulation Of Burgers Equation On Quarter Plane

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In this presentation, I peruse numerical solutions of Burgers equation by using parabolic method [1] on the quarter plane (QP), namely

$$u_t + uu_x - u_{xx} = 0, \quad x > 0, \quad t > 0,$$

with initial data

$$u(x,0) = u_+, \quad x > 0,$$

and boundary condition

$u(0,t) = u_b, \quad t > 0$ where x and t represent distance and time respectively and u_+ is initial condition and u_b is boundary condition which are constants ($u_+ \neq u_b$).

Key words: Burgers Equation, parabolic method

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The Large Time Solution of the Reaction-Diffusion-Convection Equation

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An initial-value problem for equation, namely,

$$u_t + kuu_x = u_{xx} + u(1 - u), \; -\infty < x < \infty, \; t > 0$$

with step initial data

$$u(x, 0) = \begin{cases} 1 \; as \; x \leq 0 \\ 0 \; as \; x > 0 \end{cases}$$

$$u(x, t) \rightarrow \begin{cases} 1, x \rightarrow -\infty \\ 0, x \rightarrow \infty \end{cases} \qquad t \geq 0$$

where $k \neq 0$ is a parameter is considered. By using the method of matched asymptotic coordinate expansions the large time solutions of this problem has been developed.

Keywords: Scalar Nonlinear Equation

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Some of equivalent forms of the axiom of choice

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In this paper, first, we introduce the notion of orthogonal relation and give some examples for illustration this concept. The axiom of choice, or AC, is an axiom of set theory equivalent to the statement that the Cartesian product of a collection of non-empty sets is non-empty. The axiom of choice was formulated in 1904 by Ernst Zermelo in order to formalize his proof of the well-ordering theorem. There are many equivalent statements of the axiom of choice. These are equivalent in the sense that, in the presence of other basic axioms of set theory, they imply the axiom of choice and are implied by it. In this paper, we also prove number of assertions that are equivalent to the axiom of choice.

Keyword(s): Orthogonal set , The axiom of choice.