3. International Conference on Mathematics:"An Istanbul Meeting for World Mathematicians"

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Editor

Kenan Yıldırım

Special Thanks to Our Supporters:

Chairman's Welcome Speech

Dear Colleagues ans Dear Guests,

On behalf of the organizing committee, welcome to 3. International Conference on Mathematics: *An Istanbul Meeting for World Mathematicians*, 3-5 July 2019, Istanbul, Turkey. First of all, we present our deepest thanks to Fatih Sultan Mehmet Vakif University Management due to their great hospitality and understanding. Also, we present our deepest thanks to our supporters; Muş Alparslan University, Çobanpınar Drinking Water, Zeytinburnu Municipality(in Istanbul) and Istanbul Metropolitan Municipality, Turkish Airlines and others.

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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On testing the t of the exponentiated Kumaraswamy generalized exponential distribution with right censoring

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Abstract: A few years ago, Bagdonavicius and Nikulin (2011) introduced a new technique to test the t of some parametric models when data are right censored. In this paper, we develope this statistic test for the exponentiated Kumaraswamy-generalized exponential distribution (EKw-GEE). We present the characteristics of the model and we provide the explicit formulas of the criteria test. This one can be applied to t data from all the sub-models of this distribution like the Kumaraswamy exponential distribution, exponentiated exponential distributions with dierent parameters and the Kumaraswamy generalized exponential distribution. An important simulation study was carried out and results obtained through this study are applied to real data set from reliability.

Keys words: Censored data, information matrix, maximum likelihood estimation, modied chi-square test.

Classication: 62 F03-62G05-62G10-62N 05

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Lie Group Classification for a class of variable coefficient KdV-Burgers equations

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We derive the Lie group classification for a class of variable coefficient KdV-Burgers equations which have considerable applications in Mathematical Physics. We use equivalence transformations which have a great effect in the simplification of the symmetry analysis. The derived Lie symmetries are employed to transform boundary value problems with a partial differential equation to problems with ordinary differential equation. We give the complete list of similarity reductions. A discussion is presented for more general class of related equations.

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Numerical Approaches By Nite Volumes Of A Model And Its Renewal

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Abstract: In this works, we will study the solution of problem modeling with a fractional term of nonlinear equations using laplace transformations and proof the existence and uniqueness of the solution.

We convert the equation by using laplace transformations and its properties into a di⁄erential equation and search for the solution,then use invers laplace transformations to return to the original problem.

$\frac{\partial u(x,t)}{\partial t} + u\left(x,t\right)\frac{\partial u(x,t)}{\partial x} + D_x u\left(x,t\right) + d\left(x\right)u\left(x,t\right) = f\left(x,t\right),$

or u(x,t) is the unknown function and f, d given functions satisfying given condition of regularity and convexity.

Keyword(s): mathematical modeling, fractional derivative,Laplace transformation.

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A criterion for uniqueness of weak Solutions to the 3D Navier-Stokes equations

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In this paper, we consider the three dimensional incompressible Navier-Stokes equations. We establish a new uniqueness criterion for Leray-Hopf weak solutions.

Keyword(s): Navier-Stokes equations ; Uniqueness; Weak solutions

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On the Coefficients of some Close-to-convex Functions

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The aim of this paper is to introduce a new subclasses of the Janowski type close-to-convex functions defined by Ruscheweyh derivative operator and obtain coefficient bounds belonging to this class.

Keyword(s): Univalent Function, Subordination, Close-to-Convex Function, Ruscheweyh Derivative Operator

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Stability result of the Bresse system with delay and boundary feedback

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Abstract

Our interest in this paper is to analyse the asymptotic behaviour of a Bresse system together with two boundary controls, with delay terms in the first and second equation. Assuming the weights of the delay are small enough, we show that the system is well-posed using the semigroup theory. Furthermore, we introduce a Lyapunov functional that gives the exponential decay of the total energy.

Keyword(s): Bresse system; delay; global solutions; stability; damping; exponential decay.

Acknowledgement: 35B40, 35L70.

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Numerical Calculation of the Mechanical Behaviour of a Bridge by Two structural analysis Software

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In view of the ambitious programs launched by the public authorities in the development of the infrastructure network, it is necessary to design, calculate and realize these different structures by reliable, fast and efficient methods, in order to meet the needs and requirements of its economic and social environment. The objective of this work is the numerical analysis of the mechanical response of a bridge by two structural analysis software (CSi Bridge and Autodesk robot) under the effect of mobile loads. The application was made on a multi-girder bridge with seven independent spans in prestressed concrete by post tension from penetrating of Jijel (PK10 + 400) in the project of the motorway link connecting the port of Djen-Djen to the East-West highway at El Eulma for 110 km. This work has shown that the two software give an appreciable effect on the solicitations and requires attention in the numerical calculation of the structure to avoid accidents due to the dimensioning of structures.

Keyword(s): Numerical calculation, Multi-girder Bridge, Autodesk robot, CSi Bridge.

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The resolvent operator for two-interval Sturm-Liouville problems with eigenparameter depending transmission conditions

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Sturm-Liouville type problems involving additional transmission conditions at some interior singular points has become an important area of research in recent years because of the needs of modern technology, engineering, physics and other branches of natural sciences. Many of the mathematical problems encountered in the study of transmission problem cannot be treated with the usual techniques within the standard framework of the classical theory of boundary value problems. In this study it is developed the operator-theoretical method to investigate a new type boundary value problems consisting of two-interval Sturm-Liouville problem together with additional transmission conditions at one interior point of interaction. Moreover, the eigenvalue parameter appear not only in the differential equation but also in the transmission conditions. By suggesting an our own approach we construct modified Hilbert spaces and a linear operator in it such a way that the considered problem can be interpreted as a spectral problem for this operator. Finally, we shall investigate some important properties of the resolvent operator.

Keyword(s): Sturm-Liouville problems, boundary and transmission conditions.

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Multi-station manufacturing system analysis

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This work deals with a flexible multi-station manufacturing system modelled by re-entrant line queueing model. The model incorporates classical queueing system with exponential service times and controlled arrival process under a priority service discipline. The system is decomposed into N fundamental multi-productive stations and 2N-1 classes, a part follows the route fixed by the system, where each one is processed by N stations requiring 2N-1 services. We assume that there is an infinite supply of work available so that there are always parts ready for processing step 1. Our purpose in this work is to present a detailed theoretical and simulation analysis of this priority multi-station queueing system.

Keyword(s): Queues; manufacturing; priority scheduling policies; stability; modeling; virtual infinite buffers; simulation. **References.**

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The numerical radius inequalities and its areal

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Abstract

The numerical range of A gives an estimate to the location of the eigenvalues of A. The most related concept to thenumerical range of A is the numerical radius of A, which is a quantity defined as the largest absolute value of the numbers in the numerical range. Some new upper and lower bounds for the numerical radius of a matrix are given.

Keywords: Numerical range; numerical radius; trace of matrix; Frobenius norm.

1. Introduction

The numerical range of a given complex $n\times n$ matrix A is the set defined as

$W(A)=\{\langle Ax,x\rangle, x\in C^n, \quad \|x\|=1\}$.The numerical radius $w(A)$ is defined by $w(A)=\sup_{\lambda\in W(A)}|\lambda|$.

2. Preliminaries

It is well know that if $A=(a_{ij})$ is $n\times n$ complex matrix, then $|a_{ii}|\le w(A)$.

A result due to S. Dragomir 2008.

Let A be a complex matrix. Then $w^2(A)\le\frac{1}{2}\left(\|A\|^2+w(A^2)\right)$

3. Main Results

Theorem 1 : Let $A=(a_{ij})$be an $n\times n$ complex matrix. Then $w(A)\le n\max_{i,j}|a_{ij}|$.

Theorem 2 : Let Abe a complex matrix. Then $w^2(A)\le\frac{1}{2}\left(\|A\|^2+w(A^*A)\right)$.

4. Conclusion: Several inequalities involving numerical radius and norms of matrix are given and authors, F. Kittaneh, Yamazaki, Bourin are still develop those inequalities.

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Banach Lattice f-Algebras

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A vector lattice E under an associative multiplication is said to be a Riesz algebra if the multiplication makes E an algebra, and also, the multiplication of two positive elements is again positive, i.e., $xy \in E_+$ for every $x, y \in E_+$. A Riesz algebra E is called f-algebra if E has additionally property that $x \wedge y = 0$ implies $(xz) \wedge y = (zx) \wedge y = 0$ for all $z \in E_+$. A vector lattice E is called Archimedean whenever $\frac{1}{n}x \downarrow 0$ holds in E for each $z \in E_+$. Every Archimedean f-algebra is commutative.

A norm $\|.\|$ on a vector lattice is said to be a lattice norm if $|x| \leq |y|$ implies $\|x\| \leq \|y\|$. A vector lattice equipped with a lattice norm is known as a normed vector lattice. If a normed vector lattice is also norm complete then it is called Banach lattice. An f-algebra E which is at the same time a Banach lattice is said to be Banach lattice f-algebra whenever $\|xy\| \leq \|x\|\|y\|$ holds for all $x, y \in E$. In this work, we give the general properties of Banach lattice f-algebra.

Keyword(s): Banach lattice f-algebra, f-algebra, Vector lattice

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The Topology on Banach Lattice f-Algebra

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A vector lattice E under an associative multiplication is said to be a Riesz algebra if the multiplication makes E an algebra, and also, the multiplication of two positive elements is again positive, i.e., $xy \in E_+$ for every $x, y \in E_+$. A Riesz algebra E is called f-algebra if E has additionally property that $x \wedge y = 0$ implies $(xz) \wedge y = (zx) \wedge y = 0$ for all $z \in E_+$. If a normed vector lattice is also norm complete then it is called Banach lattice. An f-algebra E which is at the same time a Banach lattice is said to be Banach lattice f-algebra whenever $\|xy\| \leq \|x\|\|y\|$ holds for all $x, y \in E$.

Let $\varepsilon > 0$ be given. For a non-zero positive vector $u \in E_+$, we put $V_{(u,\varepsilon)} = \{x \in E: \||x|u\| < \varepsilon\}$. Let $\aleph$ be the collection of all the sets of this form. Thus, $\aleph$ is a base of neighborhoods of zero for some Hausdorff linear topology. In this work, we give the general properties of this topology on Banach lattice f-algebra.

Keyword(s): Banach lattice f-algebra, f-algebra, Vector lattice

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The Densities and Distributions of the Largest Eigenvalue a Beta-Wishart Matrix

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The eigenvalues of a Wishart random matrix and have long been used in multivariate statistical analysis for a variety of analyses and applications [4]. This class was recently generalized to any $\beta > 0$ to obtain the class of Beta–Wishart matrices of which the classical real, complex, and quaternion cases correspond to $\beta = 1$, 2, and 4, respectively [1, 2].

The only known expressions for the eigenvalues, however, are in terms of infinite series of Jack functions, and in particular, the hypergeometric function of a matrix argument. These series are notoriously slow to converge and have been a computational challenge for decades despite recent progress [3]. The main issue is the exponential number of terms in (a finite truncation of) the expansion of hypergeometric function as a series of Jack functions.

We will present new results that allow the computation of the density and distribution of the largest eigenvalue of a Beta–Wishart matrix order of magnitude faster than previous results.

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Keyword(s): Wishart matrix, eigenvalue, hygergeometric function of a matrix argument
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$PreT_2$, T_2 and T_3 Proximity Spaces

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The fundamental concept of proximity spaces was introduced by Efremovich [1]. He characterized the proximity relation "A is close to B" as a binary relation on subsets of a set X. A large part of the early work in proximity spaces was done by Smirnov [2]. He showed which topological spaces admit a proximity relation compatible with the given topology. The most comprehensive study on proximity spaces was done by Naimpally and Warrack [3].

Baran [4] gave various generalizations of the usual separation properties of topology and for an arbitrary topological category over sets separation properties at a point p. He defined separation properties first at a point p, i.e., locally, then they are generalized to point free definitions. These generalizations are, for example, two notions of $PreT_2$ denoted by $PreT_2^{-}$ and $PreT_2'$, each equivalent to the classical $PreT_2$ notion (for each distinct pair x and y in X, if the set {x,y} is not indiscrete, then there exist disjoint neighborhoods of x and y) for topological spaces.

Pre-Hausdorff objects are used to characterize the decidable objects in a topos. Furthermore, it is proved that the image of a topos in a topological category by a geometric morphism is a $PreT_2'$ object. In particular, $PreT_2'$ objects play a role in the general theory of geometric realizations, their associated interval and corresponding homotopy structures (see [5]). Another use of pre-Hausdorff objects is to define various forms of each of Hausdorff objects and regular objects, and consequently normal objects in arbitrary topological categories.

The main objective of this paper is to characterize each of various notions of pre-Hausdorff, Hausdorff and regular proximity spaces. Furthermore, the relationships that arise among the various T_i, $i = 0,1,2,3$ and $PreT_2$ structures are investigated in the category of proximity spaces.

Keyword(s): Topological category, Proximity space, Pre-Hausdorff, Hausdorff, Regular.
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Reliability Bounds of Dependent Linear Consecutive k-out-of- n:G systems

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Abstract: Most of the research on reliability theory has focused on the study of independence between the components of a system.
However, in many real systems, dependence between components is one of the realistic and intractable assumptions that should be properly considered.
The purpose of this work is to provide precise upper and lower bounds for the reliability of linear consecutive k-out-of-n :G systems consisting of dependent components with identical or arbitrary distribution functions. Some comparisons are made and many examples are processed to prove the performance of the proposed method.

Keyword(s): Linear consecutive k-out-of-n :G system, upper bound (BU), lower bound (BL), reliability, dependent components, Copula.

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Some Tridiagonal Matrices with generalized Jacobsthal and Jacobsthal-Lucas Polynomial Sequences

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Special integer sequences are encountered in di¤erent branches of science, art, nature, the structure of our body. So it is a popular topic in applied mathematics. One of the special integer sequences are the Jacobsthal sequence. By changing the initial conditions but preserving the recurrence relation the Jacobsthal Lucas sequence is obtained. In this study, we define some tridigional matrices with elements depending on a polynomial. The p(x)-Jacobsthal polynomial $\{J_{p,n}(x)\}$ sequences are described by using the following recurrence relation $J_{p,n}(x) = p(x)\, J_{p,n-1}(x) + 2\, J_{p,n-2}(x)$ with initial conditions are $J_{p,0}(x) = 0$; $J_{p,1}(x) = 1$; and the p(x)-Jacobsthal-Lucas polynomial $\{C_{p,n}(x)\}$ sequences are described by using the followingrecurrence relation $C_{p,n}(x) = p(x)\, C_{p,n-1}(x) + 2\, C_{p,n-2}(x)$ with initial conditions are $C_{p,0}(x) = 2$; $C_{p,1}(x) = p(x)$. Special integer sequences are obtained with special numerical choices for p(x)-Jacobsthal polynomial and p(x)-Jacobsthal Lucas polynomial sequences.

By using the determinant of these matrices, the elements of p(x)-Jacobsthal and p(x)-Jacobsthal Lucas polynomial sequences with even or odd indices are generated. Then we construct the inverse matrices of these tridigional matrices. So, some properties of p(x)-Jacobsthal and p(x)-Jacobsthal Lucas polynomial sequences are proved by a new way. We also investigate the eigenvalues of these matrices.

Keyword(s): p(x)-Jacobsthal sequence, p(x)-Jacobsthal Lucas sequence, Eigenvalues.

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Some New Hermite-Hadamard Type Inequalities for Differentiable s-Preinvex Functions

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The object of this study is to establish new inequalities for some differentiable mappings that are connected with the Hermite-Hadamard integral inequality for s-preinvex functions.

Keywords: Hermite-Hadamard type inequality, Hölder's inequality, s-preinvex function

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Queueing Model With Working Vacation And Impatient Customers

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In this work, we study an infinite-capacity queueing system with single working vacation, impatient customers and feedback. After the completion of a service, the customer may comeback to the system if the initial one is not satisfied. We derive the steady-state solution of the queueing system using probability generating function (PGF) technique. Then, we obtain useful system performance measures.

Keyword(s): Queueing models, Vacation, Impatience.

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Soft Group Homomorphisms

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In recent years Soft Set Theory which was introduced by Molodtsov is progressing rapidly in different research areas. In this study we focus on algebra in soft set theory. To contribute this research area we examine soft homomorphism, soft isomorphism and the concepts of kernel and image of soft homomorphism of soft groups. Moreover we give some examples to clarify our definitions.

Keyword(s): Soft set, soft group, soft homomorphism.

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Mathieu Equation Stability Analysis of a Repulsive Magnetic Bearing Flywheel System

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In general, if a system has negative real parts of all poles for its transfer function, the system stability is achieved. This condition does not apply to the Mathieu equation. The stability condition of the Mathieu equation depends on the parameters. There are some engineering systems that show Mathieu equation form. In this research study, a flywheel system supported by repulsive magnetic bearings both in the axial and radial directions is proposed to have an energy-free noncontact magnetic bearing flywheel. In the proposed bearing structure, repulsive magnetic bearings do not provide a stable magnetic levitation alone but it is possible to maintain the dynamic stability of the flywheel by controlling the rotor axially. The mathematical model of the flywheel repulsive magnetic bearing system can be transformed to a Mathieu equation form. The stiffness factors generated by repulsive bearings are similar to the stiffness form of Mathieu equation.

In the research work, the stability dynamics of the repulsive magnetic bearing flywheel system is presented using the Mathieu equation approach. The stability diagram of the flywheel system is obtained using the solution of the Mathieu equation. The proposed Mathieu equation stability conditions are tested using an experimental setup. The experimental results obtained for different axial displacements of the rotor match with the Mathieu equation simulation model.

Keyword(s): Stability analysis; Mathieu equation; Flywheel system, Repulsive magnetic bearing

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A Comparative Study for Fuzzy Rough Approximation Algorithms on Datasets with Different Characteristics

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Fuzzy rough set is a theory that emerged from hybridization of rough sets and fuzzy sets. Fuzzy rough sets exhibit a strong structure to deal with different kinds of uncertainties. Because of that they are used most artificial intelligence applications nowadays. On the other hand, the performance of the methods used varies respect to structure and content of the datasets. In other words, success rate of algorithms differs in different problem types. For this purpose, it is also important to select appropriate fuzzy rough set approximations due to the nature of the problem. In this study, fuzzy operators which play an important role in fuzzy rough set theory have been introduced and mathematical background of rough set has been given. Datasets including different characteristics have been taken from https://archive.ics.uci.edu. FRNN, FRNN-O, POSNN fuzzy rough approximation algorithms have been applied to different fuzzy lower and upper approximations on these datasets. It has been investigated which algorithm has a better success in terms of time complexity and classification accuracy for each dataset with different characteristics.

Keyword(s): Rough Sets, Fuzzy Rough Sets, Fuzzy Logical Operators, Nearest Neighbor Algorithm

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On a modified goodness of fit test for validating the Weibull pareto model application to Bronchopulmonary dysplasia BPD data

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We propose a modified goodness of fit statistic test based on the wellknown N.R.R (Nikulin Rao Robson) statistic; for validating the Weibull pareto model. We establishe all the elements of the Y^2 statistic test, with the MLE parameters and the Fisher's information matrix. We carry on a simulation study to confirm the theoretical results. The usefulness of this model is illustrated by means of a real data set (case of completed data): Bronchopulmonary dysplasia BPD data.

Keyword(s): BPD data; NRR statistic; Survival analysis.

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An Intra-Host Dynamics Model of Toxoplasma *Gondii* with Indirect Interaction between Hosts

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Toxoplasma is a disease caused by a parasite called Toxoplasma *gondii* (T. *gondii*) that has three forms, i.e., tachyzoites and bradyzoites, and oocyst. The bradyzoites and tachyzoites grow in the human or the animals that play role as the intermediate host, and the oocyst grows in the feline populations that pays role as the definitive host. The transmission between the parasites in the intermediate host involves the interaction between the normal cells population, free tachyzoites, free bradyzoites, infected cells by the tachyzoites or bradyzoites, the encysted cells by bradyzoites, and the effector cells as a part of the hosts immune system. In human, the parasites can also be transmitted from mother to fetus. Reproduction of the parasites is done in the feline population, then sheds the oocyst to the environment. The oocysts can be ingested by the human and animals that lead the transmission. In this paper, we propose a dynamics model of the T. {\em gondii} that involves the indirect transmission between the parasites in the intermediate and the definitive hosts. By using bifurcation analysis, we study some conditions that the disease can be reduced from the environment.

Keyword(s): toxoplasma *gondii*, intermediate host, definitive host, stability, bifurcation analysis, reproduction ratio.
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The BLP predictor of an H-valued Functional Autoregressive Process

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We consider the Best Linear Predictor (BLP) of H-valued autoregressive process built on orthogonal projection on linearly closed subspaces of Fortet.

These forms of the BLP are given by Bosq 2014, Bosq and Mourid 2013.

We first establish large the almost sure convergence of the predictors under conditions on the decay rate of the first eigenvalues of the covariance operator, and we establish an exponential bound for our predictor.

We improve the results given by Bosq and Mourid 2013.

Simulation studies on real series illustrate its performance showing a competitive results.

Keyword(s): Functional Autoregressive Processes, enclosed subspace, measurable linear transformations, orthogonal projection, El Nino series.

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Solution of the Rational Difference Equation $x_{n+1}=\frac{x_{n-11}}{1+x_{n-3}x_{n-7}}$

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Recently, a high attention to studying the periodic nature of nonlinear difference equations has been attracted. Difference equations are used in a variety of contexts, such as in economics to model the evolution through time of variables such as gross domestic product, the inflation rate, the exchange rate, etc. They are used in modeling such time series because values of these variables are only measured at discrete intervals. In econometric applications, linear difference equations are modeled with stochastic terms in the form of autoregressive (AR) models and in models such as vector autoregression (VAR) and autoregressive moving average (ARMA) models that combine AR with other features.

The behaivour of the solutions of the following system of difference equations is examined,

$$x_{n+1}=\frac{x_{n-11}}{1+x_{n-3}x_{n-7}}$$

where the initial conditions are positive real numbers. The initial conditions of the equation are arbitrary positive real numbers.

Keyword(s): Difference equation, rational difference equation, period 7 solutions.

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On Some Characterizations of Prime N-groups

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Abstract

Prime near-rings and their extensions to near- ring modules ($N-$groups) have been studied by many authors [1-4]. The various notions of primeness that were defined in a near ring N are generalized to the $N-$group Γ [2-3]. Juglal, Groenewald and Lee [2] also provided characterizations of prime $N-$ groups and showed equivalences between these characterizations. Also in [4] the authors gave characterization of completely prime (completely semiprime) and 3-prime (3-semiprime) $N-$group.

In this study, we give some new characterizations of completely prime $N-$group and 3-prime $N-$group.

Keyword(s): near-ring, completely prime N-group, 3-prime N-group

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On Geometrical Approach of Chain Ladder Method: Properties and Application

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In this paper, a new geometrical approach of Chain Ladder method aspect is given. More precisely, development factors (k_j) are estimated by graphical technique, therefore it is required to compute the tangents for each development year j, and then the lower circles are estimated using observed circles and tangents. In order to validate the proposed approach a numerical application is conducted, the obtained results are similar to those computed by chain-Ladder method and stochastic incremental approach. Moreover, some examples are given to illustrate and show the effectiveness of the proposed approach.

Keyword(s):IBNR, Chain Ladder, Graphical Approach, provision

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Simulation and prediction of the cicatrization rate of a low carbon billet during continuous steel casting

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During the steel continuous casting, the consolidation phase in the ingot mold is very important, and it is governed by three main factors, which are the temperature, the casting speed and the oscillation of the ingot mold. Indeed, the control of these parameters makes it possible to prevent the appearance of cracks, which can generate a breakthrough. The temperature, the casting speed and the oscillation of the ingot mold. Indeed, the control of these parameters makes it possible to prevent the appearance of cracks, which can generate a breakthrough. The aim of this work is to predict the maximum cicatrization rate "τ" in order to reduce the risks of sticking the metal on the ingot mold wall and to allow the breaches of the solid skin of to reclose. A numerical simulation with MATLAB was carried out using Box's planes in order to observe the variation of cicatrization rate "τ" according to the machine parameters, which are casting speed and oscillations (amplitude, frequency) of ingot mold. The results obtained for the studied case lead to a mathematical model offering the advantage of optimizing the most interesting parameters, making it possible to predict a maximum "τ_{max}" cicatrization rate. The results obtained for the studied case lead to a mathematical model offering the advantage of optimizing the most interesting parameters, making it possible to predict a maximum "τ_{max}" cicatrization rate.

Keyword(s): primary cooling, cicatrization rate, optimization, experiments plans.

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The significance of equivalence transformations in the problems of Lie group classifications

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The group classification of a class of differential equations is reduced to integration of a complicated overdetermined system of partial differential equations with respect to both coefficients of infinitesimal symmetry operators and arbitrary elements. That is why it is a much more complicated problem than finding the Lie symmetry group of a single system of differential equations. In general, problems of group classification, except for really trivial cases, are very difficult. In the problem of group classification, it is essential, firstly, to derive the equivalence transformations admitted by the class of differential equations under study. Such transformations, which connect two equations of the same class, simplify considerably the group classification. Ordered triplets, consisting of the two connected equations and the transformation between them, together with the operation of composition of transformations have the structure of a groupoid. This groupoid is called equivalence groupoid. We demonstrate how important it is the use of equivalence transformations prior the group classification by applying this procedure to certain classes of nonlinear partial differential equations that appear recently in the literature.

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SOLVING A NONLINEAR PARABOLIC PROBLEM WITH DATA IN L1

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Abstract. In this work, we prove existence and uniqueness of entropy solution for nonlinear Dirichlet parabolic problem in bounded open subset of $\mathbb{R}^N$, with data and u0 in $L^1(\Omega)$. For this we use the Schauder fixed-point method. The results of the problem discussed can be applied to a variety of different fields in applied mathematics for example in elastic mechanics, image processing and electro-rheological fluid dynamics, etc..

Keywords : Nonlinear parabolic equations; Fixed point; Truncation function; L^1 data.
Mathematics Subject Classification (2010): 35K55; 37C25..

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Parafree Metabelian Nilpotent Lie Algebras

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In this work, we define parafree metabelian nilpotent Lie algebras. Moreover using direct limit of free Lie algebras, we prove that under some conditions a parafree metabelian nilpotent Lie algebra is isomorphic to a free metabelian nilpotent Lie algebra.

Keyword(s): Parafree, Metabelian, Nilpotent, Directed system.

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The Rayleigh Principle for Transmission Problems

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Transmission problems for the Sturm-Liouville equations with discontinuous coefficients arise in many problems of physics, such as in modeling toroidal vibrations of the earth, in vibrating of a loaded string, in diffraction problems and etc. It is important to find a complete set of eigenfunctions, or equivalently, to diagonalize the suitable differential operator in adequate infinite-dimensional Hilbert space. In the finite-dimensional case, the spectrum of a linear operator consists only of its eigenvalues.

However, the linear operators on infinite-dimensional Hilbert spaces may have not only a point spectrum of eigenvalues, but also a continuous spectrum. For many applications in science and engineering it is required to determine the eigenvalues as well as the corresponding eigenfunctions. In fact, the general theory of eigenvalues and eigenfunctions is one of the deepest and richest parts of pure and applied mathematics, mathematical physics and engineering.

This study devoted to the investigation of the Sturm-Liouville type boundary-value problems with supplementary transmission conditions. We derive some extremal properties of the eigenvalues and corresponding eigenfunctions of the considered boundary-value-transmission problems by using variational methods. Also, we shall modified the Rayleigh method for investigation some computational aspects of the eigenvalues.

Keyword(s): Boundary-value problem, Rayleigh quotient, eigenfunctions, eigenvalue.

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A Reliable Treatment of Homotopy Method for Time-Fractional Differential Equations

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In this study, we consider some linear/nonlinear differential equations (DEs) containing a local derivative operator namely "conformable". We have used it to obtain approximate solutions of the linear Klein-Gordon equation and a nonlinear time-fractional order equation. We have also used a different type of homotopy method which is separated into two different parts. In this regard, the aim of this study is to solve some illustrative linear/nonlinear problems as mathematically and to compare the exact solutions with the obtained solutions by considering their graphs. In addition to this, we have aimed to point out the reliability and simplicity of the method constructed with the conformable operator.

Keyword(s): Fractional differential equation, improved homotopy method, exact solution, nonlinearity

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Fractional Optimal Control Problem for Differential System with mixed boundary conditions

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In this presentation, we analyze the fractional optimal control problem for differential system[1,2]. The fractional time derivative is considered in Riemann-Liouville sense. Constraints on controls are imposed. Necessary and sufficient optimality conditions for the fractional mixed boundary problems with the quadratic performance functional are derived. Some examples are analyzed in details.

Keyword(s): Fractional optimal control problems; Fractional differential systems; mixed boundary conditions; Existence and uniqueness of solutions; Lax milgram theorem

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Convergence Of Double Actıng Iteratıve Scheme For A Famıly Of Generalızed Φ- Weak Contractıon Mappıngs In *Cat*(0) Spaces Kyung Soo Kim

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The purpose of this paper, we discuss the convergence theorems for the double acting iterative scheme to a common fixed point for a family of generalized ϕ-weak contraction mappings in *CAT*(0) spaces.

Keyword(s): generalized ϕ-weak contraction mapping, common fixed point, double acting iterative scheme, CAT(0) space.

2010 Mathematics Subject Classi_cation: 47H09, 47H10, 47J25, 41A65.

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Local Bifurcation of One Parameter analysis in the Greitzer compression system.

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Greitzer's compression model for flow in the axial compressor, described by four ordinary differential equations, is investigated using a local bifurcation theory analysis with one parameter. We studied the equilibrium bifurcations with the Greitzer's parameter (B), where the dynamical system has four dimensions. This study aims to determine the limits of the two aerodynamic instabilities such as surge and rotating stall. These are subject to malfunction of compressors in general and will go up to the damage of these machines. To verify this analysis, a numerical simulation is performed.

Keyword(s): Hopf bifurcation, limit point, steady state, local bifurcation**.**

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A New Approach to the Geometry of Fixed Points of Self-Mappings

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In this talk, we focus on the fixed-circle problem and investigate some geometric properties of the set $Fix(T)$, the fixed point set of a self-mapping T, on an S-metric space. To do this, we present two new contractive conditions modifying the Pata and Zamfirescu's results. Finally, we support our obtained results with some illustrative examples.

Keyword(s): Fixed-circle, S-metric space, S-Pata type x_0-mapping, S-Pata Zamfirescu type x_0-mapping.
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Parameters estimation of spatial bilinear processes in frequency domain

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Abstract

In this paper, an estimation for a parameter of spatial bilinear obtained as two frequency domain methods, one based on Whittle criterion and Taniguchi creterion. an approach based on the calculus of Kronecker product matrices is used to obtain the derivatives of the spectral function of the state-space form of the model.

Keyword(s): Spatial bilinear processes, Whittle criterion, Taniguchi criterion.

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Symmetry-breaking bifurcation in *k*-generalized 2-D discrete chaotic map

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Abstract:

The new *k*-generalized two-dimensional maps is governed by two nonlinear coordinates a monomial function and a function of two variables. This paper introduces a conjecture on the new *k*-generalized 2-D discrete maps. The conjecture predicts that for every map $\boldsymbol{f_k}$ which is odd for *k* the nonlinear physical phenomenon of symmetry-breaking bifurcation occurs for some values of *a*. Numerical results in support of the conjecture are given using the package of Maple.

Keywords: *k*-generalized 2-D discrete maps, symmetry-breaking bifurcation, bifurcation diagram, Lyapunov exponents.

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Concave operators via fractional differential equations

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It is well known that a concave operator is important for studying positive solutions of nonlinear differential and integral equations. In this paper, we study a class of mixed monotone operators with convexity, also the properties of monotone iterative technique in ordered Banach spaces, some new existence and uniqueness theorems by fixed points of operators are investigated. Finally, as applications, we apply the results obtained in this paper to study the existence and uniqueness of positive solutions for nonlinear fractional differential equation boundary value problems.

Keyword(s): fixed point; normal cone; positive solution; fractional differential equation.

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Krasnoselskii fixed point theorems involving new class of convex-power condensing multivalued mappings and application to integral inclusion.

Afif Ben Amar, Mohamed Boumaıza, Sana Hadj Amor

In this paper, we introduce a new class of convex-power condensing mappings with respect to a measure of weak noncompactness in Banach spaces. We present a new Krasnoselskii fixed point theorems for multivalued mappings which have sequentially closed graph. We prove also a new version of Leary-Schauder type results. We apply these results to investigate the existence of weak solution to a Volterrra integral inclusion of krasnoselskii type in non reflexive spaces.1

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On the bounds for the spectral norms of geometric and r-circulant matrices with Biperiodic Jacobsthal numbers

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The study is about the bounds of the spectral norms of r-circulant and geometric circulant matrices with the sequences called bi-periodic Jacobsthal numbers. Then we give bounds for the spectral norms of Kronecker and Hadamard products of these r-circulant matrices and geometric circulant matrices. The eigenvalues and determinant of r-circulant matrices with the biperiodic Jacobsthal numbers are obtained.
Keyword(s): Biperiodic Jacobsthal numbers; geometric circulant matrix; Norms

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A Study on Real Split Semi Quaternion Matrices

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In this paper, real split semi quaternions and their matrices are studied. The eigenvalues of 2x2 hyperbolic matrix of corresponding to a real split semi quaternion are given. Additionally, the properties of real split semi quaternion matrices and the adjoint matrix of a real split semi quaternion are investigated.

Keyword(s): Quaternion, Split semi quaternion, Split semi quaternion matrix

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Hardy type Inequalities with remainders

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Let Ω be spatial open set in the Euclidean space $\mathbb{R}^n$, $\Omega \neq \mathbb{R}^n$. Denote by $C_0^1(\Omega)$ the family of continuously differentiable functions $f:\Omega \to \mathbb{R}$ with compact supports lying in Ω. In this study we consider inequalities of Hardy type with weight functions depending on the distance function to the boundary of the domain Ω, i.e.

$$\delta(x) = \delta(x, \partial\Omega) = \operatorname{dist}(x, \partial\Omega).$$

Hardy type inequalities with an additional nonnegative-term are established for compactly supported smooth functions on open convex domains of the Euclidean space. More precisely, we proved Hardy-type inequalities in spatial convex domains with finite inner radius

$$\delta_0 = \delta_0(\Omega) = \sup\{\delta(x,\Omega) : x \in \Omega\}.$$

The following theorem holds.

Theorem. *Let Ω be an open convex subset of $\mathbb{R}^n$ with finite inner radius $\delta_0(\Omega)$. If $s>1$, $q>0$ and $s-q<1$, then*

$$(s-1)\int_\Omega \frac{|f(x)|}{\delta(x)^s}dx + \frac{q-s+1}{\delta_0(\Omega)^q}\int_\Omega \frac{|f(x)|}{\delta(x)^{s-q}}dx \le \int_\Omega \frac{|\nabla f(x)|}{\delta(x)^{s-1}}\left(1-\left(\frac{\delta(x)}{\delta_0(\Omega)}\right)^q\right)dx$$

for any function $f \in C_0^1(\Omega)$. If $p \ge 1$ and $r \in [1,p]$, then for any function $f \in C_0^1(\Omega)$ the following inequality

$$\int_\Omega \frac{|f(x)|^p}{\delta(x)^s}dx + \frac{r(q-s+1)}{\delta_0(\Omega)^q(s-1)}\int_\Omega \frac{|f(x)|^p}{\delta(x)^{s-q}}dx \le \left(\frac{p}{s-1}\right)^r \int_\Omega \frac{|\nabla f(x)|^r |f(x)|^{p-r}}{\delta(x)^{s-r}}\left(1-\left(\frac{\delta(x)}{\delta_0(\Omega)}\right)^q\right)^r dx$$

is valid.

Note that we also prove Hardy-type inequalities in spatial domains with finite inner radius. To establish multidimensional inequalities we obtain one-dimensional L_1-inequalities. In particular cases we obtained sharp constants. Also new Hardy type inequality with remainders for the Riemann-Liouville fractional integrals is proved. For instance, if $\rho > 0$ and $\sigma < 1 < \mu$, then

$$\int_0^\rho \frac{|f(t)|}{t^\mu}dt + \rho^{\sigma-\mu}\frac{1-\sigma}{\mu-1}\int_0^\rho \frac{|f(t)|}{t^\sigma}dt \le \frac{1}{\mu-1}\int_0^\rho \frac{|f'(t)|}{t^{\mu-1}}\left(1-\left(\frac{t}{\rho}\right)^{\mu-\sigma}\right)dt$$

for all absolutely continuously function f such that $f(0)=0$.

Keyword(s): Hardy type inequality, distance to a boundary, finite inner radius, additional term
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PMSM optimal design parameters by using inverse problem

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In electrical machine design, the direct problem is to nd the design specications by using given input. In the inverse problems we try to nd the shape of the machine that produce the itemize performance from a given output by taking into account constrained variables. From the mathematical standpoint, the inverse problems are further artful than direct problems for several reasons. By using inverse problem, we have to carry out a preset optimal design. An outline of the machine design as well as PMSM simulation results is presented. An approach for using inverse problem in electrical machine design is presented and overview of optimal machine design via inverse problems is given.

Keyword(s): PMSM, inverse problem, Monte carlo approach, design parameters.

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Some applications of linear algebra to sociology, chemistry and networks

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Linear algebra is an important field of mathematics, that is concerned with mathematical structures closed under the operations of addition and scalar multiplication. The main topics of linear algebra include the theory of systems of linear equations, matrices, determinants, vector spaces, and linear transformations.

In this study, we provide several real-world motivated examples in sociology, chemistry and networks, taking into account the matrices that provide to turn a graph/ picture into numbers

Keyword(s): Matrix; Graph; Linear Algebra
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Mobile Phone usage in teaching Calculus: Pre University Students' perspective

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In a developed country like Malaysia, smart phone has become part of everyday life and inseparable. It is noted that university students are among the highest consumers. The use of smart phone could promote constant searching for information while learning. Concerning this potential of distractions while using mobile phone, there is an urgency of understanding this issue among preuniversity students. Students who spend more time on mobile phones getting information from it compared to the traditional method, which is reading a book. This study is initiated to determine whether students' prefer and understand better using mobile phones or they prefer the normal lessons conducted in the lecture hall. 340 pre-university students (221 physical sciences [65%] and 119 life sciences [35%]) were selected to complete a set of questionnaires. These students were then be taught certain topics of Calculus using mobile phone (smart phone). A control group about 40 students (20 from physical science and 20 from life science) were taught the same topic without using mobile phone. Their academic achievement were be assessed by cumulative grade point average (CGPA) and through tests conducted during the research. The quantitative research method were applied for statistical analysis. All analyses were conducted using the Statistical Package for Social Science version 21.0 (SPSS). A random sample of these students were called to attend clinical interview to get a deeper information about the students' view. The result of the research shows that about 90% of the students' prefer using mobile phones in learning Calculus. Their CGPA result also showed an increase number of students' getting 'A' for the subject compared to the normal method used during the last semester. This research also provides a pre-university student's point of view on mobile phone usage while learning and conscientiousness implication towards learning in the Malaysian context. Based on the results a plan for academic success in pre-university students in Malaysia can be proposed such as new curriculum design for pre-University students. It is hoped that the findings will provide evidence to help academic planner and policies for improvement in academic success.

Keyword(s): mobile phones, pre University students, Calculus
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Modeling HIV Transmission with Two Interacting High-risk Groups

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We formulate a compartmental model of HIV transmission focusing on the HIV/AIDS epidemic in southwest China, which is mainly driven by two interacting high risk groups, namely, female sex workers (FSW) and male injecting drug users (IDU). Analytic expression for basic reproduction number R_0, in terms of partial reproduction numbers for the subsystems of the model, is obtained through stability analysis. Some future extensions of the model will be given, including using currently available epidemiologic and behavior data on FSWs and IDUs in southwest China to infer, or guesstimate, the current value of R_0 for the HIV epidemic in southwest China, in order to determine its current dynamic status.

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Analytical Solutions for Conformable Fractional Order (3+1)-Dimensional Telegraph Differential Equation

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In this study, an analytical solution procedure for the solution of (3+1)-dimensional conformable fractional order Telegraph differential equation is presented. For this aim, the computer software called Mathematica is employed. Some graphical illustrations of obtained solutions are given.

Keyword(s): Conformable fractional derivative, Telegraph equation, analytical solutions, fractional partial differential equations.

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Solution of the Maximum of Difference Equation $x_{n+1}=\max\left\{\frac{A}{x_{n-1}},\frac{y_n}{x_n}\right\}; y_{n+1}=\max\left\{\frac{A}{y_{n-1}},\frac{x_n}{y_n}\right\}$

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There has been a huge interest in max type of, nonlinear difference equations or systems in recent years. Difference equations are used in a variety of contexts, such as in economics to model the evolution through time of variables such as gross domestic product, the inflation rate, the exchange rate, etc. They are used in modeling such time series because values of these variables are only measured at discrete intervals. In econometric applications, linear difference equations are modeled with stochastic terms in the form of autoregressive (AR) models and in models such as vector autoregression (VAR) and autoregressive moving average (ARMA) models that combine AR with other features.

We study the behaviour of the solutions of the following system of difference equation with the max operator:

$$x_{n+1}=\max\left\{\frac{A}{x_{n-1}},\frac{y_n}{x_n}\right\}; y_{n+1}=\max\left\{\frac{A}{y_{n-1}},\frac{x_n}{y_n}\right\}$$

where the parameter A and initial conditions are positive real numbers.

Keyword(s): Difference equations, Maximum Operators, Semi-cycle.

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A simple mathematical approach for the determination of the optimal insulation thickness of cryogenic tanks

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Thermal insulation of cryogenic gas storage tanks is of great importance. It is governed by the control of heat transfer mechanisms and requires a specific analysis, because to isolate this category of tanks we have a large number of insulating materials. However, technical constraints of required performance prevent for the application of some materials. In addition to the thermophysical characteristics, other criteria must also be considered to choose the suitable insulation, namely the implementation, the lifetime, the reliability and the cost of achieved insulation. This article is based on a mathematical method for optimizing the thickness of cylindrical tanks with elliptical bottom intended for cryogenic fluid storage. The considered insulation is a uniformly applied outer layer whose thickness varies according to the boundary conditions of the external and internal tank surfaces. Radial heat transfer, based on heat conduction equation, is taken into consideration. An expression of the optimal insulation thickness derived from the total cost function and depending on the geometrical parameters of the container is presented.

Keyword(s): Cryogenics, Insulation, Mathematical method.

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Sumudu Transform Solution of the Inhomogeneous Burgers Equation

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In this study, we consider Sumudu transform (ST) which is an important integral transformation. It is well-known that using the ST makes the solution method very effective and simple. Moreover, ST can be adapted to many differential equations to obtain their solutions. In this context, this study addresses to obtain the approximate-analytical solution of the inhomogeneous Burgers equation of fractional order by using a method coupled with the ST. Also, by comparing the solutions with respect to the fractional parameter, we conclude that how the method coupled with the SD is effective and accurate.

Keyword(s): Fractional differential equation, Sumudu transform, approximate-analytical solution, Atangana-Baleanu operator

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Cuckoo search based fuzzy clustering with kernel distance for image segmentation

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This paper is dedicated to implement a Cuckoo search algorithm to optimize the centers of the clusters by minimizing the objective function of the Fuzzy Clustering (FC) problem, given by:

$J(U,V) = \sum_{i=1}^{C} \sum_{j=1}^{N} u_{ij}^{m} \|x_j - v_i\|^2$

where u_{ij} describes the degree of membership of feature vector x_j, in the ith cluster v_i and m is a fuzziness coefficient : $u_{ij} = \frac{\|x_j - v_i\|^{2/(1-m)}}{\sum_{k=1}^{C} \|x_j - v_k\|^{2/(1-m)}}$ (1)

Objective function of FC based on distance constraints (local information) is also considered which is formulated by:

$$J(U,V) = \sum_{i=1}^{C} \sum_{j=1}^{N} u_{ij}^{m} \|x_j - v_i\|^2 + \alpha \sum_{i=1}^{C} \sum_{j=1}^{N} u_{ij}^{m} \|\bar{x}_j - v_i\|^2 \quad (2)$$

where $\bar{x}_j$ is a mean value or median value of neighboring pixels lying within a window around x_j. and α controls the tradeoff between the original image and the corresponding mean-filtered image. Distance in (1) is replaced by $\|x_j - v_i\|^2 + \alpha \|\bar{x}_j - v_i\|^2$ yielding another degree of membership u_{ij}

The problem of fuzzy clustering based on kernel-inducted distance is defined by the following cost function: $J(U,V) = \sum_{i=1}^{C} \sum_{j=1}^{N} u_{ij}^{m} \|\phi(x_j) - \phi(v_i)\|^2 = 2 \sum_{i=1}^{C} \sum_{j=1}^{N} u_{ij}^{m} \left(1 - K(x_j, v_i)\right)$

where $\phi(\cdot)$ is a nonlinear transformation or mapping and $K(x_j, v_i) = \phi(x_j)^T \phi(v_i)$ is a kernel function chosen as gaussian radial based function (GRBF): $K(x_j, v_i) = exp\left(-\frac{\|x_j - v_i\|^2}{\sigma^2}\right)$. We use kernel-inducted distance to criterion (2) and obtain the following new objective function through the newly-induced distance measure: $J(U,V) = \sum_{i=1}^{C} \sum_{j=1}^{N} u_{ij}^{m} \left(1 - K(x_j, v_i)\right) + \alpha \sum_{i=1}^{C} \sum_{j=1}^{N} u_{ij}^{m} \left(1 - K(x_j, v_i)\right)$

These approaches are based on the CS optimization algorithm to find the optimum values of the clusters centers in order to classify synthetic images and magnetic resonance MRI brain images. Results show that the proposed algorithms when initialized by optimum centers given by CS has obtains reasonable segmentation of white matter, gray matter, and cerebrospinal fluid from MRI data.

Keyword(s): Images segmentation; Fuzzy clustering; Kernel distance, Cuckoo search algorithm.

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Mathematical Simulation of Residual Deformations in High-Density Polyethylene Tubes

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In this work, we present a mathematical analysis of the residual deformations of HDPE-100 polyethylene tubes in interaction with different chemical media, this study is based on the results of experimental tests which indicate that the mechanical behavior of the material is strongly influenced by the aggressiveness of chemical environments.

The modeling of residual deformations obeys very different equations from those governing the shaping of the fade. The results of this mathematical analysis of the residual deformations in the HDPE 100 tubes after exposure to different chemical media such as hydrochloric acid, sulfuric acid, crude oil and atmospheric air are presented.

Two mathematical models have been adopted, they indicate that the deformation rate, which represents the first derivative of the strain with respect to time, decreases with time and tends to cancel out.

Keyword(s): Modeling / deformations / residuals / environment / HDPE.

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Spectral properties of some unbounded operators matrices with applications

Ines Walha

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The purpose of this talk is to investigate some essential spectra of some unbounded block operator matrices defined on a Banach spaces. Some examples are introduced to illustrate the validity of the theoretical results.

Keyword(s): Operator matrices, essential spectra, Fredholm perturbation, perfect periodic boundary conditions, transport operator.

Acknowledgement: I would like to thank all the members of the committee of organizing this international conference on mathematics.

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Using Hilbert curve for Data collection in WSN with mobile Sink

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In recent years, wireless sensor networks (WSN) have gained worldwide attention, due to the advances in microelectronics and wireless communications. The primary goal of WSNs is to gather and route the collected data to the Sink. Several existing methods use mobile Sink in sensor network have proven that the lifetime of the network can be extended significantly compared with the case of static Sink. Mobile Sink visits each sensor node and collects data via single hop, or it visits nodes which are designated as Rendez-vous Points (RP), the RP can be real position of sensor node or real position of cluster head or virtual position in the sensor field. The list of RP can be fixed, tree-based or clustering based.

Our idea in this work is to optimize the energy consumption and the data collection in WSN. The first step is to divide the sensor field into virtual clusters corresponding to the unit square of the Hilbert curve. The Hilbert curve order depends on the density of sensor nodes and on the dimension of the sensor field. The second step is to apply our 0-1 integer linear program (ILP) developed in [1] to find the optimal virtual position which is considered as Virtual Rendez-vous Point (VRP) then the Sink travels from one VRP to another following the Hilbert curve. We note that our ILP aims to find the optimal transmission power level for sensor nodes. The sensor node uses this optimal transmission range to transmit their data towards the Sink when this last one is in the appropriate VRP of the cluster through one-hop communication. In order to justify our choice of the Hilbert curve, we realized a comparative study between some optimization methods used in the literature for the generation of the Sink trajectory in the sensor field. The optimization methods used are the travelling salesman problem, which is an exact method, the Tabou search meta-heuristic and the Simulated Annealing meta-heuristic. The results of experiments made by simulation showed the supremacy of the proposed approach compared to the ones used in literature.

Keyword(s): Hilbert curve, Optimization, Integer Linear Programming, WSN, Mobility, Energy saving.

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Local T_4 Objects in the Category of Proximity Spaces

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Various generalizations of the usual separation properties of topology and for an arbitrary topological category over sets separation properties at a point p are given by Baran [1]. He defined separation properties first at a point p, i.e., locally, then they are generalized this to point free definitions by using the generic element, method of topos theory. These generalizations are, for example, four notions of T_4, each equivalent to the classical T_4 notion for topological spaces.

Proximity spaces were discovered by Efremovich during the first part of 1930s and later axiomatized [2,3]. He characterized the proximity relation "A is close to B" as a binary relation on subsets of a set X. This theory was improved by Smirnov [4]. Smirnov was the first to discover relationship between proximities and uniformities. Efremovich defined the closure of a subset *A* of *X* to be the collection of all points of *X* "close" *A*. In this way he showed that a topology (completely regular) can be introduced in a proximity space. He also showed that every completely regular space *X* can be turned into a proximity space by using Urysohn's function. The most extensive work on the theory of proximity spaces was done by Naimpally and Warrack [5]. All preliminary information on proximity spaces can be found in this source.

The main goal of this paper is to characterize each of various notions of T_4 objects at a point p in **Prox**, the category of proximity spaces and proximity mappings. Moreover, we investigate the relationships among separation properties at a point p in this category.

Keyword(s): Topological category, Proximity space, Local separation properties, Normal objects.
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Modeling of adsorption isotherms and kinetics of Methylene blue dye from aqueous solution by activated carbon prepared from waste animal bones

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The activated carbon prepared from waste animal bones with HNO_3 as activation was investigated under microwave radiation. The surface characteristics of the AC prepared under optimized conditions were examined by SEM and FTIR. This study investigates the effect of some parameters like, dye concentration, adsorbent dose, contact time and pH for the best comprehension of the adsorption manner. The adsorption process follows the pseudo-secondorder kinetic model. Langmuir and Freundlich isotherms models were used to analyze the adsorption equilibrium data and the best fits to the experimental data were provided by Freundlich model.

This study shows that the activated carbon prepared from waste animal bones can be an alternative to the commercially available adsorbents for dyes removal from liquid solutions.

Keyword(s): Activated carbon, Waste animal bones, Microwave, Chemical activation, Adsorption, Kinetics.

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On Fractional Differential Equations with Integro-Differential Boundary Conditions

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The topic of fractional differential equations has been of great interest for many researchers in view of its theoretical development and widespread applications in various fields of science and engineering such as physics, biophysics, chemistry, statistics, economics, control theory, and many other fields. Boundary value problems with integral boundary conditions constitute an important class of problems and arise in the mathematical modeling of various phenomena such as heat conduction, wave propagation, gravitation, chemical engineering, underground water flow, and plasma physics. They include two-point, three-point, multipoint, and nonlocal boundary value problems.

In this work, we are interested in a boundary value problem of fractional differential equations with fractional integro-differential Boundary Conditions. Relying on fixed point theory we prove the existence of at least one solution.

Keyword(s): Fractional differential equations, Caputo fractional derivative, fixed point, Boundary value problem.

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An Application of Vague Sets in Decision Making Problems

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In recent years vague concepts have been used in different areas as medical applications, pharmacology, economics, engineering since the classical mathematics methods are inadequate to solve many complex problems in these areas. Researchers have proposed many methods for vague notions. The most successful theoretical approach to the vagueness is undoubtedly fuzzy set theory proposed by Zadeh in 1965. Rough set theory which was proposed by Pawlak in 1982 is another mathematical approach to vagueness to catch the granularity induced by vagueness in information and the theory is based on equivalence relations. Molodtsov initiated a novel concept of soft set theory which is a completely new approach for modeling vagueness in 1999. A soft set is defined to be a collection of approximate descriptions of an object.

To address decision making problems based on fuzzy soft sets, Feng et al. introduced the concept of level soft sets of fuzzy soft sets and initiated an adjustable decision-making scheme using fuzzy soft sets. Feng et al. first considered the combination of soft sets, fuzzy sets and rough sets. Using soft sets as the granulation structures, Feng et al. defined soft approximation spaces, soft rough approximations and soft rough sets, which are generalizations of Pawlak's rough set model based on soft sets. It has been proven that in some cases Feng's soft rough set model could provide better approximations than classical rough sets.

In this study we present an example in medicine which aims to find the patients with high prostate cancer risk by using a multi-criteria decision making method. We presented a method by using the hybrid models obtained by combining fuzzy and soft sets a medicine problem calculating the risk of prostate cancer.

Keyword(s): fuzzy sets, rough sets, soft sets, decision making problems

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Optimization of the burnishing treatment parameters for AISI 316L steel by response surface method

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Ball burnishing is one of the most competent finishing operations used for enhancing the surface quality and the service life of components. Many properties of materials can be improved via this process, namely surface roughness, microhardness, fatigue resistance and wear resistance. However, it is very necessary to choose the appropriate combination of burnishing parameters to succeed the treatment. This work aims to optimize the process parameters, i.e. burnishing force, burnishing feed and ball diameter in order to improve the surface roughness of 316L stainless steel. A Response surface method based on Box-Behnken design was followed for the experimentations, and an empirical model expressing the relation between surface roughness Ra and input parameters of the process was developed. The optimum regime to obtain the minimum roughness was also established. It is shown by these results that Ra can be significantly decreased, and attains a lower value by 84%.

Keyword(s): Ball burnishing, stainless steel, surface roughness, optimization.

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Quadratic Regression Model for Study of the Tribologically Transformed Surfaces under Indentation

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Abstract

This study is based on an analysis of curves and micrographs to know the evolution of the effect of impacts, and the values of micro-hardness Vickers and chemical analysis. The micrographic observations illustrate the infiltration of aluminium or tin in copper as veins form, lunures or waves in a lenticular zone (hardened) of copper. In addition, EDX analyzes performed in the aluminum absorption in copper didn't reveal any alloy formation. The mechanisms responsible for its transformations are unknown, it appears that modelisation based on dynamic recrystallization, and mechanical alloying or adiabatic shear can provide some answers. Concerning modeling, we have elaborate microhardness model in the case of dynamic indentation by exploiting the response surface methodology (RSM), using a quadratic regression model. Combined effects of four impacts parameters on the performance outputs microhardness is explored by a statistical analysis of variance (ANOVA). Results show that the microhardness is influenced principally by nature of samples, nature of ball and height of projection ball. Also, it is that indicated that the indentation depth is the dominant factor affecting the microhardness.

Keyword(s): *Dynamic indentation, tribologically transformed surface, controlled energy, infiltration, RSM, ANOVA*
Acknowledgement:

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A Mathematical Approach to Learning Problems

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Strong Stability of the Embedded Markov Chain in an M/PH/1 Queue

Phase-type queueing systems are used to approximate queues with general distributions. The approximating distribution should be close to the original one in some sense. However, considering the calculations' complexity as well as the algorithm's efficiency requirements, it is not possible to exactly match the two distributions. Additionally, the model's parameters are estimated by means of statistical methods which constitutes another source of perturbations. Hence, it is important to check the robustness of the system and estimate the resulting deviation of its characteristics. The strong stability method is a powerful approach for this purpose. In this work, we prove the robustness of the underlying Markov chain and estimate an upper bound of the deviation of the stationary vector, resulting from the perturbation of the service times distribution of M/G/1 queueing system

Keyword(s): Stong stability, Markov chain, Queueing systems, Phase-type distributions, Perturbation.

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Elastodynamics of 3D Quasicrystals in Inhomogeneous Media

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According to the generalized elasticity theory; the dynamical equilibrium equations of 3D quasicrystals are

$$\rho\frac{\partial^2 u_i(x,t)}{\partial t^2}=\sum_{j=1}^{3}\frac{\partial \sigma_{ij}(x,t)}{\partial x_j}+f_i(x,t),\quad i=1,2,3, \tag{1}$$

$$\rho\frac{\partial^2 w_\beta(x,t)}{\partial t^2}=\sum_{j=1}^{3}\frac{\partial H_{\beta j}(x,t)}{\partial x_j}+g_\beta(x,t),\quad \beta=1,2,3, \tag{2}$$

where $x=(x_1,x_2,x_3)\in R^3$, $t\in R$; u_i and w_α are phonon and phason displacements; $\rho>0$ is the density; $f_i(x,t)$ and $g_\beta(x,t)$ are body forces for the phonon and phason displacements, respectively. σ_{ij} and $H_{\beta j}$ are phonon and phason stresses, respectively. Initial value problem for (1) and (2) is considered with the zero initial data.

Keywords: quasicrystals, Hooke's law

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Fractionnal calculus based method for Chemical kinetics modelling of the release of active pharmaceutical ingredients

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Studying the distribution of drugs in the body needs the collection of large numbers of plasma samples to see how the change happens. However, taking large numbers of samples from a patient is difficult. As a consequence, mathematical models based on based on mass balance analysis are used to predict changing drug concentration over time to the body.
The aim of this work is to test the faisability of applying the fractionnal calculus modeling in the field of chemical engineeing. A comprasion between ordinary and fractional differential modeling is conducted to determine the best fractional parameters (n-order kinetic, Caputo fractional derivative of order*),* the optimization of these parameters has been conducted using hybrid optimization approach based on genetic algorithm and lsqcurvefit algorithm. A database has been collected from literature regarding the distribution of concentration over the time of an intravenous dose in the body.
It has been shown that zero-order differential kinetic with fractional derivative order of 0.5870 describe experimental distribution of the intravenous drug in the body with high accuracy, in comparison with the ordinary differential modeling in terms of a very low average absolute relative deviation AARD of 4.0766% and acceptable correlation coefficient R of 0.9943. The AARD of the ordinary differential modeling is 23.91% and R of 0.9746.

Keyword(s): Fractional Calculus, Modeling, Drug kinetics.

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Numerical Investigation of Heat Transfer Enhancement in a Horizontal Duct for Laminar Nanofluid Flow

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Nanotechnology is used in all areas of life, for example in industrial, military, medical, agricultural and other fields.

Cooling by conventional fluids such as water, oil or ethylene glycol is more important in industrial applications. Unfortunately, these fluids have low thermal conductivity. The idea of improving the thermal conductivity is that of the addition of solid particles with very good thermal conductivity and nanometric size (size less than 100 nm) within the base fluid. This new generation of fluids is called (nanofluids). This term was proposed by Choi in 1995 in the national argon laboratory.

Mixed convection heat transfer in ducts is encountered in many industrial applications such as the solar energy collectors, nuclear reactors, cooling of electronic equipment, heat exchangers, and others. In these applications, it is necessary to obtain an exact description of the thermal and hydrodynamic fields under all operating conditions.

The present work concerns the numerical study of the flow and heat transfer of nanofluids in a horizontal duct subjected to a uniform heat flux. The dynamic viscosity and thermal conductivity of the nanofluid are approximated by approximations found in the literature. The finite volume method was used to discretize the three-dimensional governing partial differential equations. For the convective and diffusive terms a power-law scheme was used while the SIMPLER procedure was introduced for the velocity–pressure coupling. The system of equation obtained was solved by a numerical code developed in FORTRAN.

The effects of the Grashof number and the nanoparticles volume fraction on the hydrodynamic and thermal structures, and heat transfer coefficient were examined. The results are obtained for different Grashof number ($10^3 \leq Gr \leq 10^5$) and different solid volume fraction ($0\% \leq \emptyset \leq 7\%$).

The results obtained show that the presence of the nanoparticles has a significant effect on the hydrodynamic and thermal fields, as well as on the coefficient of heat transfer.

Keyword(s): Mixed Convection, Horizontal Duct, Nanofluid, Partial Differential Equations, Finite Volume Method

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Two-Parameter Xgamma Distribution: Different Methods of Estimation

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Two-parameters Xgamma distribution is a relatively new probability distribution in the vast literature of distribution theory for modeling the positive-valued and skewed data. The aim of the current study is to estimate parameters of the two-parameters Xgamma distribution employing different estimation methods such as maximum likelihood, moments, L-moments, least-squares, weighted least-squares, and maximum spacing. We compare the estimation performances of these estimation methods by comprehensive Monte-Carlo simulation studies performed on the different sample of sizes small, moderate and large. To illustrate the application of the evaluated methods to the real-world phenomenon, we present an example using a real data set.

Keyword(s): Lifetime distributions, Statistical inference, L-moments estimation, Maximum likelihood estimation, Least-square estimation.

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Measure of Noncompactness and Differential Inclusions with Hadamard Fractional derivative

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Problems related to fractional differential equations and inclusions have attracted the attention of a large number of mathematicians, engineers and scientists due to their wide application in many real life areas.

This paper is devoted to the existence of solutions for a boundary value problem of fractional differential inclusions involving Hadamard type derivatives in Banach spaces. The results are obtained using an appropriate fixed point theorem combined with the technique of measures of noncompactness.

Keyword(s):
Differential inclusions, fractional calculus, fixed point, measure of noncompactness, Banach space.

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A Study On Some New Soft Sets In Soft Bitopological Spaces

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This disquisition, which consists of interrelating sections is devoted to the definition and study of the concepts of (1,2)*- soft b- open sets, (1,2)*- soft b –closed sets, (1,2)*- soft regular - open, (1,2)*- soft preopen, (1,2)*-soft semi open, (1,2)*- soft α - open, (1,2)*- soft β - open in soft bitopological spaces and exhibit the properties of them. Following these definitions of soft set properties are made and the relations between these soft sets are presented by theorems and remarks.

Keywords: (1,2)*- softb- open set, (1,2)*- soft b –closed set, (1,2)*-soft regular- open, (1,2)*- soft pre open, (1,2)*-soft semi open, (1,2)*- soft α - open, (1,2)*-soft β -open, (1,2)*- soft b-interior, (1,2)*- soft b- closure.

Mathematics Subject Classification: 54E55, 54C08, 54C19.

Acknowledgement: Known concepts are mentioned in the text along with appropriate references.

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Bayesian estimation of a spectrum of a nonstationary spatial AR

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Abstract

The parametric spectrum estimator for the purpose of nonstationary spatial autoregressive process analysis is presented. The proposed estimator is obtained by minimization of the Bayesian risk function corresponding to the normalized mean square spectral error measure. The obtained results concern the two most frequently used methods of the nonstationary process: the Kalman filter approach and the approach based on the exponential weighting of the past data.

Keyword(s): Bayesian spectrum, spatial AR processes, Kalman filter, posterior probability density.

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Some stability properties of Mc Kean-Vlasov stochastic differential equations

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We study the existence of an optimal control for systems governed by stochastic differential equations of mean-field type. In these equations, the drift and the diffusion coefficient depend not only on the state of the system, but also on the expectation of some function of the state. For nonlinear systems, we prove the existence of an optimal relaxed control, by using tightness techniques and Skorokhod selection theorem. In the case where the coefficients are linear maps and the cost functions are convex, we prove by using weak convergence techniques the existence of an optimal strict control, adapted to the initial filtration We consider Mc Kean-Vlasov stochastic differential equations (MVSDEs), which are SDEs where the drift and diffusion coefficients depend not only on the state of the unknown process but also on its probability distribution. This type of SDEs was studied in statistical physics and represents the natural setting for stochastic mean-field games. We will first discuss questions of existence and uniqueness of solutions under an Osgood type condition improving the well known Lipschitz case. Then we derive various stability properties with respect to initial data, coefficients and driving processes, generalizing known results for classical SDEs. Finally, we establish a result on the approximation of the solution of a MVSDE associated to a relaxed control by the solutions of the same equation associated to strict controls. As a consequence, we show that the relaxed and strict control problems have the same value function. This last property improves known results proved for a special class of MVSDEs, where the dependence on the distribution was made via a linear functional.

Keyword(s): Mc Kean-Vlasov stochastic differential equation -- Stability -- Wasserstein metric -- Existence -- Mean-field control -- Relaxed control

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Determination of the Solar Cells internal parameters using the Two Diodes Model

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The photovoltaic conversion uses the principle of the direct transformation of the light energy into electrical energy. Solar cells are able to make this transformation. The first solar cell using homojunction silicone has been fabricated in BELL laboratories in 1954 with a yield around 6%. This yield was increased to become 10% using monocrystalline silicone. After that, many works on the enhancement of the solar cells yield have been published. However, this yield did not accede 30% due to several factors.

In this work, we have used a photovoltaic model which is the two diodes model to determine the internal parameters of a solar cell (n_1 and n_2 the quality factor of the first and the second diode, I_{ph} the photocurrent, I_{s1} and I_{s2} the saturation current of the first and the second diode and R_s the sheet resistance) from the fabricant parameters (I_{sc} the short circuit current, V_{oc} the open circuit voltage, the current I and the voltage V at the maximum power P_{max}. The determination of the internal parameters was done by solving a nonlinear system of five equations using the Newton-Raphson method. Some solar cells types such as MSX60, SM55 Siemens, GTO-136-80 and Shell 36s were used. According to this model, the internal parameters of all these gave as information the strong and the weak points in each type of the studied solar cells.

Keyword(s):
Solar cells; Modelling; Two diodes model; internal parameters

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New Inequalities of Hermite-Hadamard Type for Differentiable s-Preinvex Functions

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In this study, some new inequalities of the right-hand side of Hermite-Hadamard type for differentiable s-preinvex functions are established. Also some parallel results are obtained which are based on preincavity.

Keywords: Hermite-Hadamard type inequality, Hölder's inequality, s-preinvex function

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Some Curvature Properties Of Non-Reductive Pseudo Riemannian Manifolds Of Dimension Four

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In this paper we considered non-reductive homogeneous pseudo Riemannian manifolds of dimension four and investigated recurrent curvature tensor condition for those curvature tensor. We classified non-reductive homogeneous pseudo Riemannian manifolds with recurrent curvature tensor, and we have shown that only one case has non-trivial (non flat and non locally symmetric) solution and in the other cases, admitting the recurrent curvature tensor condition is equivalent to be locally symmetric or flat curvature tensor and only for one case we have not any 1-form so that satisfy in recurrent curvature tensor. Then we investigated some geometrical concepts for them like Weyl tensor, Einstein property and etc., we obtained some results, for example any non-reductive homogeneous manifold with non-trivial recurrent curvature tensor is locally conformally flat. We also studied Ricci solitons for these spaces and concluded that any non-reductive homogeneous manifold with non-trivial recurrent curvature tensor is a steady Ricci soliton.

Keyword(s): Pseudo Riemannian manifold, Recurrent curvature tensor, Locally Symmetric, Flat, Ricci soliton.
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A new bio-inspired optimization algorithm for data clustering

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In this article, we present Seasons Algorithm (SA), a new stochastic globally search and optimization strategy. The SA is inspired by the natural growth cycle of trees in the different seasons of a year. It is an iterative population-based algorithm working on a set of solutions known as population. In the SA terminology, each candidate solution in the population is referred to as a tree and the population is called forest. Until the termination condition is satisfied, the population of solutions is updated to a new generation by applying four main operators similar to the trees life cycles in the seasons of a year including: (i) renew in spring, (ii) growth- competition in summer, (iii) reinforcement in autumn and (iv) resistance in winter. These operators hopefully cause the trees to converge to a state of solution space that is the global optimum. We evaluate the effectiveness of the SA algorithm using optimization multi-variable benchmark functions. The results indicate that the SA algorithm outperformed its state- of-the-art counterparts. The SA algorithm is then employed for data clustering task. Experiments on real benchmarks for data clustering indicate that the SA algorithm is encouraging and outperformed several other comparison algorithms.

Keyword(s): Season algorithm, evolutionary algorithms, meta- heuristic algorithms, global optimization
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A Mathematical Model Based on Fuzzy Logic for Predicting Projects Cost

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This paper describes the development of a mathematical model for the running cost of maintenance of buildings based on fuzy logic approach. Fuzzy logic as a soft computing method is discussed in this paper in the aim to produce an accurate mathematical model for budgeting the cost for rehabilitation and maintainance of buildings during their life cycle. Regression analysis on the obtained result was conducted to ascertain the precision of the model.

Keyword(s): Soft computing; Fuzzy logic; Cost model; Accuracy

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An Application of q-Derivative to a Subclass of Harmonic Univalent Functions

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We introduce and investigate a special class of harmonic univalent functions by using Al-Oboudi q-differential operator. We first obtained a coefficient characterization of these functions. Using this coefficient estimates, distortion and covering theorems, and some properties were also obtained.

Keyword(s): Al-Oboudi differential operator, Salagean differential operator, harmonic univalent function, qcalculus, starlike and convex functions, analytic functions

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Rank of Semigroup: Generating Sets and Independent Sets

Sampson, Marshal Imeh

Zsolt Lipcsey

We investigate the role of independence as compared to that of generating systems in semigroups with the aim of characterizing rank of semigroups. Howie and Ribeiro gave five definition for rank which rely on both concepts. Given a maximal independent subset $B \subset S$ of a semigroup S, it is possible to find an infinite number of larger independent subsets than the finite basis B for some semigroups.

We construct examples for semi-groups - finite and infinite, commutative and non-commutative where there exists finite basis and the number of independent elements is larger than the basis indicating that the concept of independence cannot be relied upon in characterizing rank. We identify a major reason for this limitation in the existing characterization by Howie and Ribeiro.

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Estimation of conditional hazard function in the single functional index model under random censorship

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This work presents a nonparametric estimate of the conditional hazard function, when the covariate is functional and when the sample is considered as an -mixing sequence. We prove consistency properties (with rates) in various situations, including censored and uncensored variables. The pointwise almost complete convergence and the uniform almost complete convergence (with rate) of the kernel estimate of this model are established.

Keyword(s): Censored data, conditional hazard function, functional variable, nonparametric estimation, single functional index process, small ball probability, strong mixing processes..

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QTAG-Modules Isomorphic to their Fully Invariant Submodules

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A right module *M* over an associative ring with unity is a *QTAG*-module if every finitely generated submodule of any homomorphic image of *M* is a direct sum of uniserial modules. Some algebraic structures are isomorphic to their substructures but it is not always true. Sometimes they are isomorphic to their substructures with certain properties. This interesting fact motivates us to investigate *QTAG*-modules which are isomorphic to their proper submodules with special conditions. Here we study *If*-modules which are isomorphic to their fully invariant submodules. We define admissible sequence of the *Ulm-Kaplansky* invariants to define *If*-module and investigate their properties.

Keyword(s): *QTAG*-modules, essentially indecomposable modules, HT-modules.

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Magnetohydrodynamic Sakiadis Flow of Williamson Fluid over a Horizontal Plate with Cattaneo-Christov Heat Flux Model

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Magnetohydrodynamics (MHD) Sakiadis boundary layer flow of Williamson fluid over a horizontal plate is presented in this paper by considering the Cattaneo-Christov heat flux model. This innovative model is introduced to predict the effects of thermal relaxation time on the boundary layer. The governing partial differential equations are transformed to a system of nonlinear ordinary differential equations using similarity transformations. A third-order Finite Difference Method for the ordinary differential equation is used to find the local similarity solutions of the problem. The results are presented in terms of velocity, temperature and concentration profiles for various values of the governing parameters including the local Weissenberg number, the local Hartmann number, the Prandtl number, the local Deborah number and the Schmidt number. The Weissenberg and local Hartmann numbers are shown to decrease the velocity and to increase the temperature and concentration of the fluid. As the local Deborah number increases, the relaxation time of the heat transfer of the fluid increases and delays the time for the fluid to experience heat conduction.

Keywords: Williamson Fluid, Cattaneo-Christov Heat Flux Model, Sakiadis Flow, Magnetohydrodynamic.

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tests for generalized exponential AFT distributions with censored data

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Generalized exponential models have numerous applications particularly in reliability studies. Using the approach proposed by Bagdonavicius and Nikulin for censored data, we propose the construction of modied chisquare goodness-of-t tests for the generalized exponentiated exponential model (GEE) and an accelerated failure time model with the generalized exponentiated exponential distribution as the baseline (AFT-GEE). Based on maximum likelihood estimators on initial data, these statistics recover the information lost while grouping data and follow chi-square distributions. The elements of the criteria tests are given explicitly. Numerical examples from simulated samples and real data have been presented to illustrate the feasibility of the proposed tests.

Keyword(s): Accelerated failure time models- Chi-square test- Maximum likelihood estimation- Reliability.
Classi cation: 60E15-62F03f62 F12-62G 05

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The Relation Between Chebyshev Polynomials and Jacobsthal and Jacobsthal Lucas Sequences

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Abstract

Special integer sequences are encountered in different branches of science, art, nature, the structure of our body. So it is a popular topic in applied mathematics. One of the special integer sequences are the Jacobsthal sequence. By changing the initial conditions but preserving the recurrence relation the Jacobsthal Lucas sequence is obtained. The Jacobsthal $\{j_n\}$ sequences are described by using the following recurrence relation $j_n = j_{n-1} + 2\, j_{n-2}$ with initial conditions are $j_0 = 0$; $j_1 = 1$; and the Jacobsthal-Lucas $\{c_n\}$ sequences are described by using the following recurrence relation $c_n = c_{n-1} + 2c_{n-2}$ with initial conditions are $c_0 = 2$; $c_1 = 1$; the generalized Jacobsthal $\{J_n\}$ sequences are described by using the following. recurrence relation $J_n = J_{n-1} + 2\, J_{n-2}$ with initial conditions are $J_0 = a$; $J_1 = b$. The main purpose of this paper is to establish some new properties of Jacobsthal, Jacobsthal Lucas sequences in terms of Chebyshev polynomials. Moreever, some connections among Jacobsthal, Jacobsthal Lucas sequences are revealed by using the power of some special matrices. And also the properties of Jacobsthal, Jacobsthal Lucas numbers are obtained by using the identities of Chebyshev polynomials

Keyword(s): Chebhshev polynomials Jacobsthal and Jacobsthal Lucas Sequences.

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Additive bias correction technique for discrete associated kernel

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This article proposes the additive bias correction technique (ABC) for discrete associated kernels in the context of probability mass function estimation. Some properties of the ABC discrete kernel estimator (bias, variance and mean integrated squared error) are established. The popular cross-validation technique is proposed for bandwidth selection. Finally, a simulation study and a real data application for discrete data illustrate the performance of the ABC estimator based on discrete kernels.

Keyword(s): Additive bias correction technique, Cross-validation, Discrete associated kernels, Simulation study

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Dynamical Quantum Gates as a Tool for Topological Data Analysis

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Abstract

Topological Data Analysis (TDA) is deals with data sets from different branches of natural and social sciences and involves the fundamental concepts of persistent homology to study the basic topological properties of Rips complices based on the n point data clouds. Numerically the results of TDA could be represented via the fractal characteristics (like Hausdorff's dimension of the data cloud) or via the set of barcodes for the Betti numbers vs the radii of the bolls surrounding each data point to form the corresponding Rips complex.

The most efficient classical Giovannetti-Lloyd-Maccone algorithm (2008) involves at least n^2 bits to evaluate the Betti numbers of such simplicial complex. The k-th Betti number demands the time $O(n^k)$ for its calculation, and the estimation of Betti numbers for all orders to the accuracty d takes time $O(2^n \log(1/d))$. From another side, the same Rips simplicial complex can be mapped onto an n-qubit quantum state via the Lloyd-Garnerone-Zanardi approach (2016), with the time cost proportional to $O(n^5/d)$ for the calculation of its persistent homological properties.

In all existing quantum approaches the estimation of the persistent homologic properties for the Rips compleces is performed in a sequence of standard computational operations under the Grover algorithm: the simplicial complex quantum state preparation, the uniform mixture state construction, the phase estimation and, finally, the measurement. The second and third stages of the process are based on the fixed CNOT quantum logical gates.

Here we discuss the opportunity to improve the efficiency of TDA using the concept of externally driven dynamical quantum gates. The gate operatör is changing in time itself, and it can be converted from CNOT to other operators and back, depending on computational needs. In this case the sequence of logical operators acting on qubits during the computation can be replaced by the dynamical transformation just of few quantum gates. The stages of quantum state preparation and the mixed state construction could be optimized under our dynamical scenario. We illustrate the basic idea of our approach with the examples of the Betti numbers estimation for the small n data clouds.

Keywords: Persistent Homology, Quantum Topological Data Analysis, Quantum Logical Gates, Controlled Qubit

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Boole Polynomail Solutions of Linear Volterra Integro-Differential Equations

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This study aims to develop a numerical method which is used for the approximate solution of the Volterra integro-differential equation under mixed conditions. For this purpose, the problem is reduced from the linear algebraic equation system to the matrix equation. This system is solved by using Boole polynomials, their derivatives and collocation points. From this solution, the Boole coefficients are obtained for the approximate solution. Numerical examples are given for to demonstrate the validity and applicability of the technique. Also, the results are compared with the graphs and tables.

Keyword(s): Boole polynomials, collocation points, approximate solutions, numerical, integro-differential equation.
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Optimal Control of Advection-Diffusion Process with a Bilinear Control

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The aim of this study is to discuss an optimal control of advection-diffusion process governed by a bilinear control. Performance index is defined as a measure of the dynamic response and a penalty term on control energy. The proposed approach uses a reduction of order in the model, Pontryagin's maximum principle and a numerical technique. Using a modal space expansion method the distributed parameter system is transformed into a lumped parameter system. The obtained system corresponds to a bilinear system in the temporal term. Pontryagin's maximum principle is used to obtain the optimal control function that leads to a nonlinear two-point boundary value problem. An iterative numerical technique for determining optimal trajectories and optimal control of the system is discussed. Quasilinearization is a procedure for solving the nonlinear two-point boundary value problem. The programming is done in MATLAB platform. Numerical results show the effectiveness and applicability of the introduced bilinear control.

Keyword(s): Bilinear control, quasilinearization method, Pontryagin's maximum principle.

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A combined BTV term with a based tensor second order PDE for image super-resolution

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Abstract

In this work, we investigate a partial differential equations (PDE) based on a diffusive tensor combined with a bilateral total variation (BTV). The proposed PDE takes the benefit from the classical model of Perona-Malik in the homogeneous regions, the Weickert model near sharp edge and reducing the blur by the BTV process. The proposed super resolution PDE allow to preserve image components such as corner and flat region with less apparition of blur near edges.
As the super resolution problem is ill-posed, we are going to prove the existence and uniqueness of the solution of the proposed equation in a suitable Sobolev space. The robustness and the efficiency of our SR PDE are illustrated in the context of enhancement by some numerical tests. Surprisingly, the apparition of blur in the restored image is less compared to the others classical methods. In addition, to visual evaluation, PSNR and SSIM-based metrics ensure the improvements offered by the proposed PDE.

Keyword(s): Super-resolution, PDE, BTV, fixed point theorem, Tensor diffusion.

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A New Study on the Discontinuity at Fixed Point

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In this talk, we give a new solution to the discontinuity problem concerning Rhoades' question on the existence of a contractive definition which is strong enough to generate a fixed point but which does not force the map to be continuous at the fixed point on *S*-metric spaces. We support our theoretical results with an illustrative example.

Keyword(s): Discontinuity, S-metric, fixed point.

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Parseval and carleman equalities for Sturm-Liouville problems under jump conditions

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Sturm-Liouville problems are boundary-value problems that naturally arise when solving certain partial differential equation problems using the "separation of variables" method. The "Rayleigh quotient" is the basis of an important approximation method that is used in solid mechanics as well as in quantum mechanics. In the latter, it is used in the estimation of energy eigenvalues of nonsolvable quantum systems, e.g., many-electron atoms and molecules. The simplest applications lead to the various Fourier series, and less simple applications lead to generalizations of Fourier series. It is the purpose of this paper to extend and generalize such important spectral properties as Rayleigh quotient, eigenfunction expansion, Rayleigh-Ritz formula(minimization principle), Carleman equality for Sturm-Liouville problems with interior singularities. Often in physical problems, the sign of the eigenvalue, is quite important. The Rayleigh quotient cannot be used to explicitly determine the eigenvalue since eigenfunction is unknown. However, interesting and significant results can be obtained from the Rayleigh quotient without solving the differential equation. Nonetheless, it can be quite useful in estimating the eigenvalue. For example, the equation $\frac{dh}{dt} + h = 0$ is certain heat flow problems. Here, positive, corresponds to exponential decay in time $\frac{d^2h}{dt^2} + \lambda h = 0$, while negative, corresponds to exponential growth. In the vibration problems only positive , corresponds to "usually" expected oscillations. Namely, any eigenvalue can be related to its eigenfunction by the Rayleigh quotient

Keyword(s): Sturm–Liouville Problems, Carleman Equalities, jump conditions.

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Statistical Modeling of Contact Wear Polluted Elastohydrodynamics

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Progress in the mechanical industry increasingly requires the use of special parameters to improve the service life of the mechanisms. Among these operating conditions, solid pollution is one of the most difficult enemy.

Statistical modeling is a simplified way and mathematically formalized to approximate the reality, so it is a tool not to neglected to model the degradation of the lifetime of contact surfaces. Although these undesirable particles can lead to premature wear of the machine elements or even a total failure of the mechanisms.

The objective of this work is to statistically model the influence of lubricant contamination by solid pollution on an elastohydrodynamic contact. Based on TAGUCHI's experimental plans and analysis

Keyword(s): Contact, Lubrication, Solid pollution, Wear.

The exponential bounds and the a.s. convergence of the BLP predictor of a C[0;1]-valued autoregressive process.

We establish exponential bounds and the a.s. convergence of the Best Linear Predictor of a C[0;1]-valued autoregressive process. Simulation studies on real series illustrate their good performance and show competitive results.

Keyword(s): Functional Autoregressive Processes - Best Linear Predictor- Measurable Linear Transformations - Covariance Operator - Estimation.

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A hybrid Model based Artificial Intelligence to Assessing Construction Cost

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This study conducted in the aim of developing a mathematical model based on artificial intelligence using neural network and mathematical functions. This development could be, used in the field of construction engineering and management in assessing the factors that could be a success or failure to construction projects through the evaluation of the process of tendering. The basic principle consists of interconnecting the different factors to model this phenomenon. Initially, we create a neural network model type recurrent neural network and a fuzzy logic model. Afterwards, the neural network and fuzzy logic approaches were combined for the development of a hybrid model to predict the proposed problem called Adaptive Neuro-Fuzzy Inference System (ANFIS). The results of three models were compared and the results show that the ANFIS model is very encouraging and is better than, those obtained by recurrent neural network and fuzzy logic.

Keyword(s): Recurrent neural network; Fuzzy logic; Adaptive neuro-fuzzy inference system

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Quadratic regression model used for Study of geometrical features in laser claddings

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A continuous CO2 laser (10.6 μm wavelength) was adopted to investigate the influence of powder particle sizes on microstructural and morphological characteristics of laser claddings.

To study the potential of powder in controlling the incident laser energy, different average particle sizes of Ni-base powder were deposited on an austenitic stainless steel X3CrNi18-10 substrate. The energy value necessary to melt a mass m of powder was calculated. The results indicate that this energy decreases with particle sizes.

The claddings obtained with small particle sizes revealed a good morphological aspect and a low dilution of the clad layer with the substrate, enough to create a very good metallurgical bond. The residual stress state was also influenced. Concerning modelling, we have elaborate residual stress model in the case of laser cladding by exploiting the response surface methodology (RSM), using a quadratic regression model. Combined effects of three laser cladding parameters on the performance outputs residual stress is explored by a statistical analysis of variance (ANOVA). Results show that the residual stress is influenced principally by power delivered by laser beam and scanning speed, also, it is that indicated that the size of particle powder, is the dominant factor affecting the residual stress

Keyword(s): Laser cladding, Particle size, Energy absorption, Morphology, Microstructure, RSM, ANOVA

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Digital Determination of Landslide Problems

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Among the natural hazards in the Skikda region (Northeastern Algeria), land movements are probably the most damaging to the natural and human environment. This region is one of the Algerian regions most affected by this phenomenon, because it is located in a complex geomorphological environment. This article presents a numerical analysis of the landslide located in this city.

The traditional tools used to deal with landslide problems are based on simple statistical approaches (limit-trending equilibrium calculation). These approaches are not rigorous since they do not take into account the seismic action on the structures. However, the recent progress made in the fields of computer science and numerical computation (finite element method) leads to a better control of the slope stability problem.

In our case the numerical modeling is performed using the PLAXIS 2D 8.6 calculation code. The behavior of the soil is described by the elastoplastic model criterion of Mohr Coulomb. The analysis applies to a real case (East-West highway). The results present an approach of elaboration of a device of comfort and treatment of problem of landslide.

Keyword(s): Analysis / Numeric / Sliding .

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Nonlinear Partial Differential Equations Related to Baouendi-Grushin Vector Fields

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We present a sharp Hardy type inequality with non-radial weight for the Baouendi-Grushin vector fields : $\nabla_\gamma = (\nabla_x, |x|^\gamma \nabla_y)$ where $\gamma > 0$, $\nabla_x$and ∇_y are usual gradient operators in the variables $x \in \mathbb{R}^m$and y $\in \mathbb{R}^k$, respectively. A simple argument based on sharp Hard-type inequality is used to obtain non-existence of positive solutions for some nonlinear eliptic and parabolic partial differential equations related to Baouendi-Grushin vector fields.

Keyword(s): Hardy inequality, Baouendi- Grushin operator, Nonexistence of a positive solution

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Bell polynomial solutions of high order linear Volterra integro differential equtions with functional delays

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In this study, a combining matrix-collocation method based on Bell series and collocation points is presented to find the solution of Volterra integro-differential equations with variable coefficients involving functional delays under the mixed conditions. This method reduces the mentioned problem to a matrix equation corresponding to the system of linear algebraic equations with unknown Bell coefficients. Thereby, the solutions of the problem are obtained in terms of Bell polynomials.Some illustrative examples, which arise in physics, biology, chemistry, mechanics and so on, are included to indicate the reliability and applicability of the method. Also, an error analysis technique based on residual functions is performed to check the accuracy of the solutions.

Keyword(s): Volterra integro differential equaton, Bell polynomials and series, matrix - collocation method, functional delays, residual error.

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On Chi squared testing of the Weibull Pareto model And its Application on Arm-A head and neck cancer data

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We propose a modified goodness of fit statistic test based on the wellknown N.R.R (Nikulin Rao Robson) statistic in censoring case; for validating the Weibull pareto model. We establishe all the elements of the Y^2 statistic test, with the MLE parameters and the Fisher's information matrix in case of censorship. Simulations study are running to affirm our theoretical results. The usefulness of this model is illustrated by means of a real data set (case of censored data): Arm-A head and neck cancer data.

Keyword(s): Arm-A data; Censored data; NRR statistic.

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Analytical method for calculating the mechanical properties of a laminated fiberglass and epoxy resin composite material

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This scientific work consist of analytically calculating the mechanical properties of a fiberglass / epoxy composite laminate and to compare them with those obtained experimentally in a 03-point bending test. The material studied is a laminate composite consisting of 16 symmetric folds designated [06/902] s. By determining the volume fraction of fiberglass in this material, we can, thanks to the application of micromechanical models, calculate its Young longitudinal E_L and transverse E_T modules as well as the shear moduli. From the experimental curves of the mechanical behavior of this material stressed in 3-point bending, we can obtain the Young's modulus by applying an empirical formula that takes into account the dimensions of the test pieces tested. A concordance of the results was noted which justifies the analytical calculation

Keyword(s): Analytical method, composite material, mechanical characteristics

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Comparison between two strip rolling models

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The present paper proposed to compare between two mechanical models used for the rolling process. The classical model based on slab method (1D) and the two-dimensional model based on the lubrication theory (shearing model).

In the classical model, the shear stress is assumed small and for a very wide sheet $\varepsilon_2 = 0$, so that the horizontal equilibrium is obtained by Karman equation $h\frac{d\sigma_x}{dx} = (\sigma_z - \sigma_x)\frac{dh}{dx} - \tau \quad (1)$ where h is the half width of the slab and σ_x, σ_z and τ respectively denote the longitudinal, normal and shear stresses. Introduction of a law of behavior and a law of friction makes it possible to obtain a differential equation with one unknown whose solution is obtained by the method of Rungee-Kutta.

In the shearing model, in connection with the nano-rheology of thin film based on the assumption that the flow is shear controlled and so that the pressure p doesn't depend on the height of strip. The equilibrium equation is given by $-\frac{\partial p}{\partial x} + \frac{\partial \tau}{\partial z} = 0 \quad (2)$ where τ vanishes on the axis $(z = 0)$, so $\tau = \partial p / \partial z \quad (3)$.

Starting from (3) and integrating twice with to respect to z, the flow quantity is obtained a $Q = 2\int_0^{h(x)} v_1(z)dz = Q_0 \quad (4)$ where Q_0 is constant along the deformation zone, so the pressure gradient is easily calculated in the linear case, so that $\frac{\partial p}{\partial x} = \frac{2v_0 h - Q_0}{2h^2(h/3\eta + 1/\alpha)} \quad (5)$.

For a given position of the neutral point (point where the relative velocity vanishes), the (1) and (5) equations are integrated from the entrance point to the outlet. The neutral point is obtained by the shoot method.

The non-dimensional approach is used for the comparison of two models in viscous Newtonian case.

The results show that 1D model is closer to the reality particular for a little friction, but shearing effects may be important, in particular for large friction. In addition, the shearing model is better for very lows thickness.

Keyword(s): Rolling, modeling, Newtonian viscous, No-dimensional,
Acknowledgement: The authors would like to thank the Algerian general direction of research (DGRSDT) for financial support and technical assistance.

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Estimation of the Risk Function under Right Random Censoring with Modified Kernels. Numerical Studies and Example

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We consider the estimation of risk function under random right censoring with the kernel method introduced by Muller et al. These kernel estimators with varying bandwidth and kernel correct well boundary effects near the endpoints of the support and reduce the increase of the variance over the range of abscissae where the risk function is estimated . We illustrate by numerical simulations the behavior of both classical (unmodified) and modified kernel estimators of the risk function. Under different models of lifetime and random rights censoring, we show the performance of modified kernel estimators based on errors L1 and L2, next, we investigate a real example of survival data from colon cancer and we estimate local biases and local variances. The study shows that this boundary correction works well in practice and gives good behavior of the estimators, it also lead to smaller integrated mean squared errors as compared to the unmodified estimators.

Keyword(s): Risk function, Modified Kernel density estimator, Boundary effect, Boundary kernels, Data-adaptive bandwidth, Survival analysis.

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Mathematical Modeling of Breast Cancer in Early Stage Based On the Cell Cycle and Cell Regulations

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Breast cancer is a malignant cancer where the main causal factors are still unclear. There are some known factors that able to increase someone risk to suffer the disease, i.e., over or lower production of hormones, genetic, lifestyle, etc. One important hormone for the growth of breast tissue is Estrogen, but it also plays an important role for the growth of breast cancer via the induction of DNA damage by producing the oxidative metabolites. It also provokes excessive proliferation that triggers the tumorigenesis process. The substantial regulation that governs cell proliferation and growth is restriction point and DNA damage checkpoint, and estrogen has a critical role in this regulation. The key effectors of estrogen action in those regulations are C-Myc and CycD1. In this paper we construct a mathematical model of the cells regulations based on the DNA damage response and the cell cycle. We use numerical simulation to show the molecular situations for the early stage of breast cancer.

Keyword(s): estrogen, breast cancer, DNA damage response, GI/S transition phase.
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Coupled Lattice Boltzmann Method for viscoelastic Oldroyd-type fluids: the evolution of the elastic pressure

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One of the major challenges in computational fluid dynamics is the simulation of the viscoelastic fluid flows. This class of fluids has been extensively studied with the help of various numerical methods. In this work we propose an approach based on Lattice Boltzmann method to simulate viscoelastic fluids at low Reynolds number. Three kinds of distribution functions are proposed, two scalar distributions for evolution of the momentum and the elastic pressure, and one tensor distribution for evolution of the deviatoric stress. The elastic pressure (trace of the spherical stress component) gives us information about the elongation of polymers melted in solvent. Elastic instabilities could happen in viscoelastic flows as the Weissenberg number is enlarged, a four-rolls mill geometry is considered to examine those instabilities.

Keywords: LBM , Viscoelastic fluid, Oldroyd-type Model, Deviatoric stress, Elastic pressure

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Bifurcation of limit cycles from quartic isochronous systems

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We study the number of limit cycles that bifurcate from the periodic solutions surrounding a uniform isochronous center located at the origin of the quartic polynomial system. By using the averaging theory of first order, it shows that under any small quintic homogeneous perturbations, at most 14 limit cycles bifurcate from the period annulus of the considered system.

Keyword(s): Averaging method, Limit cycles, Uniform isochronous center

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Some applications of the *(p,q)*-Lucas polynomials to an unified class of bi-univalent functions

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In the present paper, by using the $L_{p,q,n}(x)$ functions, our methodology intertwine to yield the Theory of Geometric Functions and that of Special Functions, which are usually considered as very different fields. Thus, also making use of the Ruscheweyh derivative operator D^n, we aim at introducing a new class of bi-univalent functions defined through the *(p,q)*-Lucas polynomials. Furthermore, we derive coefficient inequalities and obtain Fekete-Szegö problem for this new function class.

Keyword(s): *(p,q)*-Lucas polynomials, coefficient bounds, bi-univalent functions, Ruscheweyh derivative operator.

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Almost Contact B-metric Structure on 5-dimensional Nilpotent Lie algebras

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The classification of almost contact B−metric manifolds was done. It is determined which class of Sasaki-like almost contact B−metric manifolds fall into. D−homothetic deformation of almost contact B−metric manifolds within certain class is shown to be within the same class. The almost contact B−metric structures are studied on 5−dimensional nilpotent Lie algebras. It is investigated which class of 5 dimensional nilpotent Lie algebras with the B−metric structure fall into.

Keyword(s): Almost contact B-metric manifold, 5-dimensional nilpotent Lie algebras with almost contact B-metric structure, D-homothetic deformation.

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A Fixed Point Theorem and Ulam Stability

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In the talk, we present a fixed point theorem for operators acting on some classes of functions and with values in n-Banach spaces. We also give some its applications to Hyers-Ulam stability of eigenvectors and some functional and difference equations.

The presented results were obtained jointly with Janusz Brzdęk.

Keyword(s): fixed point theorem, Ulam stability, n-Banach space.

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A Rotation Minimizing Frame and Ruled Surface in R^n

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In this paper, the pitch and the angle of pitch of a closed ruled hypersurfaces are calculated according to a Rotation minimizing frame in R^n.

Keyword(s): Rotation minimizing frame (RMF); Ruled surface; the pitch; the angle of pitch.
Acknowledgement: The first author would like to thank Tubitak-Bidep for their financial supports during her PhD studies.

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Mathematical model for antibiotic resistant bacteria and immune cells

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Currently, WHO (World Health Organization) report confirms that the antibiotic-resistant infections are the greatest threat to health. Despite the new therapeutic strategies, the bacteria develop mechanisms to defend themselves against antibiotics. In our work, we propose a mathematical model describing the dynamics of resistant bacteria, non-resistant bacteria and immune cells exposed to an antibiotic. The global stability of equilibria is performed by using a Lyapunov functions.

Keyword(s): Mathematical modeling; Antibiotic resistance; Lyapunov function; Global stability.

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Dissipative Singular Differential Operators of First Order

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In this paper, the parametrization of maximally dissipative extensions of the minimal operator generated by first order linear symmetric singular differential-operator expression in the Hilbert space of vector-functions defined at the right semi-axis has been given with the using of Calkin-Gorbachuk method. Finally, the structure of spectrum set of such extensions is researched.

Keyword(s): Dissipative operators, deficiency indices, spectrum

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On the Spectral Radius and Operator Norm of Finite Upper Triangular Block Operator Matrices

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In this work, a class of finite square upper triangular block operator matrices on the direct sum Hilbert spaces for which spectral radius is strongly less than of operator norm has been found.

Keywords: Block operator matrix, spectrum, spectral radius, operator norm

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A Goodness-of-fit tests based on the empirical distribution function for the AFT-Bertholon model

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In this work, we consider some nonparametric goodness-of-fit tests for AFT-Bertholon distribution. Kolmogorov-Smirnov, Cramer-Von-Mises, Anderson-Darling, Watson and LiaoShimokawa are proposed.

We use the Monte Carlo simulation method for calculate the critical values for each test for several sample sizes and significance levels. The power of the proposed tests can be specified for different sample sizes and considering diverse alternatives.

Keyword(s): Accelerated failure time model, Bertholon model,Kolmogorov-Smirnov statistic, CramerVon-Mises statistic, Anderson-Darlingstatistic, Watsonstatistic, Liao-Shimokawastatistic.

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Global Stability Analysis for a Generalized Delayed SIR Model with Vaccination and Treatment

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In this work, we investigated the stability of a SIR epidemic model with a generalized nonlinear incidence rate and distributed delayed. As this type of model was used in modeling pandemic such as Influenza, we also include the vaccination and the treatment which are the two principal control measures to reduce the disease burden. via the basic reproduction number R_0 of model, which depends on the efficacy of the vaccination and slope of the treatment function at the begin of the infectious, we show the sharp epidemic property. By constructing a Lyapunov functional, we show that the disease-free equilibrium state is globally asymptotically stable if $R_0 \leq 1$ and that the disease-endemic equilibrium is globally asymptotically stable when $R_0 > 1$. Our analysis showed also how the vaccination strategy should depend on the rate of the treatment in the population.

Key words: generalized nonlinear incidence rate, distributed delay, Lyapunov functionals, vaccination, treatment.

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Application of mathematical fractional calculus in modeling of apple slices drying in thin layer

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We present in this study a novel model based on fractional calculus incorporating non- integer time derivatives in the Fick's first law of anomalous diffusion, the experimental data has been collected from literature of fifteen kinetic investigated in a convective dryer under the effect of temperature ranging from 40 to 80 °C at 10°C interval and the thickens of the slices of 2 to 6 mm at 2 mm interval.

Also, Sixty-four thin-layer drying models were studied. The fitting capability of the models is compared using the mean of root mean square error MRMSE(%) of all kinetics and the global determination coefficient R^2. All models constants and coefficients were optimized by Dragonfly algorithm programmed in Matlab software. Regression – I model was found to be the best model for describing the drying curves of the apple slices with $R^2$of 0.99968 and MRMSE of 0.61%.

Based on this model, a new model has been proposed with fractional order instead of second order, the results showed that is later is highly capable to describe the drying curve of apples with a determination coefficient (R^2) of 0,99981and MRMSE of 0.43% .

Also, the fractional approach gives acceptable results of R^2 of 0.99981 and MRMSE of 0.59%. Comparing the three models, the n fractional calculus approach performance was in all kinetics approximately equals to the proposed model, but slightly higher than Regression – I model.

Keyword(s): Thin-layer drying, fractional calculus, empirical and semi-empirical modeling.

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Descriptive Features of Divorce in Turkey

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The divorce is one of the leading problems in today's conditions. Due to the certain economic, social and cultural reasons, the couple prefers to live single with their children, parents or alone. In order to determine the major effects which cause the divorce, a very comprehensive survey has been conducting in Turkey in every five-year. This survey is called TAYA (Turkey Family Structure Research) 2016 and executed by the Ministry of Family and Social Policies. In this study, by a special permission from Turkish Statistical Institute, we detect the descriptive features of this survey, by analyzing certain questions in details such as which type of demographic properties are generally seen in divorce couples? What are the common educational, economical and familiar backgrounds in divorces? Is the violence one of the major reasons in divorces? Having children does really affect this decision? In our analyses, we aim to define these sociological properties via statistical analyses and aim to find the common features in divorce and spousal relations.

Keywords: Divorce Occurrence in Turkey, Statistical Analyses, Extracting Common Features
Acknowledgement: The authors thank to Turkish Statistical Institute for their permission to analyze this dataset.

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A Quarter-symmetric Metric Connection on Almost Contact B-metric Manifolds

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We study a quarter-symmetric metric connection on almost contact B-metric manifolds. We deduce the relation between the Riemannian connection and the quarter-symmetric metric connection. We investigate the curvature tensor, Ricci tensor and scalar curvature tensor of almost contact Bmetric manifolds with respect to the quarter-symmetric metric connection.

Keyword(s): Quarter-symmetric metric connection, almost contact B-metric manifold, metric connection.

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Assessment of Low Achievers in Solving 'Guessing Game' Combine Problems

All teachers encounter children with different abilities. It is a constant challenge and teachers do their best to identify the poor performers and understand the reasons for their poor performance.This study arises out of research in a school where the majority of students, aged between seven and nine, had experienced substantial difficulty in problem-solving in mathematics. The study was designed to discover why such a large body of students had so many difficulties in solving what, to their peers elsewhere, might be seen as simple arithmetic problems well within their capabilities. The study was designed with guessing games to discover the extent of the students' difficulties and the reasons for them. 27 students were studied over a a period of many months. Each was interviewed face-to-face. All interviews were videotaped and the recordings were studied and analysed and relevant data extracted.

The guessing game was found to be particularly illuminating as regards a child's ability to understand part-whole relation. The child was asked to guess what could be the possible combinations of numbers within boxes. In this game, through the different guesses that the child freely makes, the researcher can find out how different numbers relate in their conception of number.

The findings disclosed a number of problems in both procedural and conceptual knowledge, the details of which, it was felt, could help the teachers understand the symptoms of the poor performance and the reasons for it so that they could then design a suitable remedial programme.

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A Modified Chi-squared Goodness-of-fit test for the AFT-Bertholon and its Applications

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In this work, we propose firstly the construction of a new model called AFT-Bertholon. This new model combines the accelerated failure time model with a competing risks model proposed by Bertholon et al. (2004).

Next, we suggest the construction of a modified chi-squared goodness-of-fit test for AFTBertholon model. We use the NRR (Nikulin-Rao-Robson) statistic based on maximum likelihood estimation for ungrouped data.

We applied this new model and the corresponding statistic test to numerical examples from simulated samples and real data.

Keyword(s): Accelerated failure time model, Bertholon model, Competing risks model, Chi-squared goodness-of-fit test.

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On Some Metrics with Recurrent Curvature Tensor

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In this paper we studied some curvature properties of special metrics with physical applications. We showed that strictly walker manifolds of dimension four are with recurrent curvature tensor and also we specified the sufficient condition for these manifolds to be locally symmetric. We also showed that oscillator groups,equipped with aone parameter family of left invariant Lorentzian metrics and with recurrent curvature tensor, are locally symmetric. Also recurrent curvature condition for some other metrics which are physically relevant significant were checked, e.g., generalized symmetric pseudo Riemannian manifolds which were showed that are not with recurrent curvature tensor.

Keyword(s): Strictly walker manifolds, Pseudo Riemannian manifold, Recurrent curvature tensor, Oscillator group, Generalized symmetric, Locally Symmetric.
Acknowledgement:

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Solution of initial value transmission problem by the Adomian decomposition method

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The Adomian decomposition method has been used widely in solving ordinary and partial differential equations, Sturm-Liouville problems, physical problems and stochastic problems. We will adapt the Adomian decomposition method to nonclassical boundary value problems the main feature of which is the nature of the equations and boundary conditions imposed. Namely, the boundary conditions contains not only end points of the considered interval, but also an interior point of singularity at which given additional so-called transmission conditions, so our problem is nonclassical once. Based on decomposition method and our approaches, a new analytical treatment is introduced for such type transmission problems.

In this study, we examine the differential equation,

$$y''(t) - 2y'(t) + 5y(t) = 0, \qquad t \in [0, \tfrac{1}{2}) \cup (\tfrac{1}{2}, 1] \text{ together}$$

with initial conditions

$$y(0) = -1, \qquad y'(0) = 7 \qquad \text{and} \quad \text{additional}$$

transmission conditions at the point of singularity $\mathrm{t} = \frac{1}{2}$ given by

$$y\left(\tfrac{1}{2} - 0\right) = k_1 y\left(\tfrac{1}{2} + 0\right), \quad y'\left(\tfrac{1}{2} - 0\right) = k_2 y'\left(\tfrac{1}{2} + 0\right).$$

Particularly, we shall find the Adomian polynomials for left-hand and right-hand solution of this problem. Afterwards, we will compare the approximate solution with the exact solution of the considered problem.

Keywords: Adomian decomposition method, transmission conditions, approximate solution.

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Wear of Cutting Edge Principle Is' It The Lifetime Criterion Of The Helicoidally Drill In HSS?

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ABSTRACT

In this work, the results of an experimental investigation are presented to put into evidence the wear evolution of chisel and main cutting edges of high-speed steel helical drills (HSS) during the machining of hardened and unhardened C22 steel. To do so, a series of tests was carried out according to the experimental design methodology. The investigated output parameter is the tool wear (lifetime) whereas, the input parameters are the cutting regime elements (cutting speed, feed rate and drill diameter). Machining was performed in the presence of an abundant lubrication. Unlike ISO standard (3685: 1993), stating that the criterion of permissible wear (VBmax = 0.5mm) to determine the tool lifetime is that of the major flank face (main cutting edge), it is found that for some experimental design regimes the increase in speed of the wear of the chisel cutting edge is higher than that of the main cutting edge; i. e., a more intense wear grows earlier on another cutting edge of the active part of the drill than the standardized one. Thus, the permissible wear criterion has to be taken into account when determining the lifetime of cutting tool. The analysis of the obtained results also reveals that the wear of the chisel cutting edge is more intense for the regimes working with low feeds and low cutting speeds. Meanwhile, we note that machining with higher cutting speeds and low feed rates contributes to reduce wear on the chisel cutting edge.

Keyword(s): *Wear, Lifetime, Drilling, HSS drill, Hardened steel.*
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Asymptotic analysis of frictional contact problem for a dynamic piezoelectric shallow shell

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The objective of this work is to study the asymptotic justification of a new two-dimensional model for the equilibrium state of a dynamic piezoelectric linear shallow shell in frictional contact with a rigid foundation. More precisely, we consider the Signorini problem with Tresca friction of a dynamic piezoelectric linear shallow shell in contact with a rigid foundation. Then, we establish the convergence of the mechanical displacement and the electric potential as the thickness of the shallow shell goes to zero.

Keyword(s): Asymptotic analysis; dynamic piezoelastic shallow shell; Signorini problem; Tresca friction

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Soft Topological Group Homomorphisms

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Molodtsov introduced the concept of soft sets, which can be seen as a new mathematical tool for dealing with uncertainty. Soft algebraic structures and soft topological structures were studied by many researchers and each of them has their own point of view. In this study, we deal with the algebraic structure of soft topological groups based on soft element structure such as soft topological group homomorphism, concepts of kernel and image of soft homomorphism of soft topological groups and so on.

Keyword(s): Soft set, Soft topological group, Soft topological group homomorphism.

Acknowledgement: This work is supported by the Scientific Research Project of Muğla Sıtkı Koçman University, SRPO (no:16/001)

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A New Version of the Pasting Lemma on a Fuzzy Soft Topological Space

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In this talk, we give a new version of the pasting lemma via mixed structure on a fuzzy soft topological space. For this purpose, we present a new notion of a (υ_1,υ_2)-g-closed fuzzy soft set and investigate some basic properties of this notion.

Keyword(s): Pasting lemma, fuzzy soft topological space, mixed structure, (υ_1,υ_2)-g-closed fuzzy soft set.
Acknowledgement: The author is very grateful to Prof. Dr. Nihal Yılmaz Özgür for her valuable comments and suggestions on this talk.

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A topological property of the common fixed points set of Multi-functions in b-metric spaces

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In 2008, Sintamarian has proved some results on absolute retractivity of the common fixed points set of two multifunctions. On the other hand, Suzuki generalized the notion of contractive mappings in 2008. Since then, there has been a lot of activity and a number of results have appeared on Suzuki's method for mappings and multifunctions.

Recently Mirmostafaee has established set-valued version of Suzuki's fixed point theorem when the underling space is a complete b-metric space. In this paper, by using the upper methods, we present some new results on absolute retractivity of the common fixed points set of multivalued Suzuki type contractions.

Keyword(s): Absolute retract, fixed point, Suzuki contractive multifunction.

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Generalized Helices and Frame of Frenet-Type

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A helix (resp. slant helix) is defined by the property that its tangent (resp. normal) vector field makes a constant angle θ with a fixed line l which is the axis of the curve in space. Then some new kinds of curves called clad and g-clad helices are introduced in Euclidean 3-space in [4]. In this talked we investigate helices according to Frenet frame of the versor field. Also we show that singular locus of the tangential Darboux developable surface is coincide with striction line of the surface.

Keyword(s): generalized helices, striction line, frame of frenet type.

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Regular Dynamics Of Two Dimensional Piecewise Map

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Abstract

A discrete time dynamical systems represented by the iteration of piecewise functions is introduced in this work. The dynamical behaviors, multiple basins with fractal boundary, attractors, route to chaos via bifurcations are investigated. Moreover, we point out an fascinating form of complex basin structure in the presence of multistability and coexistence of several attractors. We also show by numerical simulation different types of bifurcations that can occur in such map, including transitions to chaotic attractors.

Keyword(s): piecewise smooth systems, basin bifurcations, chaos.

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Approximate Solution Procedure for Conformable Fractional Order (3+1)-Dimensional Telegraph Differential Equation by Residual Power Series Method

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The main of this study is to obtain the numerical solutions of conformable fractional order (3+1)-dimensional Telegraph differential equation with the aid of an approximate solution procedure namely Residual Power Series Method. Conformable derivative with fractional order is applicable, understandable and reliable definition, which satisfies the basic properties of Newtonian concept derivative.

Keyword(s): Conformable fractional derivative, Residual Power Series Method, Telegraph denklemi, numerical solutions, fractional partial differential equations.

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Fractional Scaling Functions for Solving Pantograph Equation

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The main aim of this research is evaluating the numerical solution of fractional delay differential equation, well known as fractional pantograph equation, in the following form

$$D^{\alpha}\,\xi(t) = \nu(t)\xi(t) + \sum_{j=1}^{m} \omega_j(t) D^{\beta_j}\xi\left(\rho_j\, t\right), \qquad 0 \le t \le T, \quad n-1 < \alpha < n, \tag{1}$$

where $0 \le \beta_j \le \alpha$ and $0 \le \rho_j \le 1,\ \ j = 1,2 \ldots, m$. The initial conditions of equation (1) are as follows

$$\xi^{(k)}(t) = \lambda_k,\ \ k = 0,1,\ldots, m-1.$$

The pantograph equation is a kind of delay differential equation which arises in many disciplines of science and engineering such as; number theory, dynamical systems, probability, quantum mechanics and electrodynamics. In this paper utilizing compact support cubic B-spline scaling functions, we present a new applicable and simple approach for solving the mentioned equation. For this purpose, first a summary of fractional calculus and definitions and properties of cubic B-spline wavelets are expressed. Taking advantage of Laplace transform, the Riemann-Liouville fractional integration of cubic B-spline scaling functions is constructed. Then operational matrix of fractional integration for B-splines is obtained and applied for approximating and evaluating Caputo fractional derivatives of unknown function in equation (1). Using the relations between fractional integration and derivative, the main equation is reduced to some algebraic system. In the following collocation method is implemented for solving the current system. For showing the accuracy and efficiency of the introduced method some illustrative examples are given and the results of purposed method are compared with the results of some other existing methods.

Keyword(s): Pantograph equation, fractional calculus, B-spline scaling functions

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The Second Order q-Haar Distribution

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We define a p-adic distribution called the second order q-Haar distribution which is closely related to the well-known q-Haar distribution. We will give some basic functional equations involving the integrals against the second order qHaar distribution in analogy with the functional equations obtained from the classical q-Haar distribution.

Keyword(s): p-adic distribution, p-adic integration, q-Haar distribution Acknowledgement:

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Regularized Maximum A Posteriori Method for Image Deconvolution with Regularization Parameter Estimation

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Image deconvolution consists in restoring a blurred and noisy image knowing its Point Spread Function (PSF). This inverse problem is ill-posed and need prior information to obtain a satisfactory solution. Bayesian inference approach with appropriate prior on the image has been used successfully in particular with a Gaussian prior on the image. Bayesian Maximum A Posteriori (MAP) method, an estimation which has been considered recently, is unstable and suffers from serious ringing artefacts in many applications. To overcome these drawbacks we propose a regularized MAP method where we minimize an energy functional combined by the mean square error with H1 regularization term, and we consider the Generalized Cross Validation (GCV) method, a widely used and very successful predictive method, for choosing the smoothing parameter. The proposed method is effective for simple deconvolution of blurred images. Theoretically, we study the convergence behavior of the method and we give some numerical tests to show its effectiveness.

Keyword(s):
Image deconvolution, Bayesian approach, Regularization, GCV method.

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Recent results in Berezin number inequalities

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Let $B(H)$ denote the C^*-algebra of all bounded linear operators on a complex Hilbert space H with an inner product $<.,.>$ and the corresponding norm $||.||$. A functional Hilbert space $H = H(\pi)$ is a Hilbert space of complex valued functions on a (nonempty) set π, which has the property that point evaluations are continuous i.e. for each $\alpha \in \pi$ the map $f \longrightarrow f(a)$ is a continuous linear functional on H. The Riesz representation theorem ensure that for each $\alpha \in \pi$ there is a unique element $k_a \in H$ such that all $f \in H$. The collection $\{k_a : a \in \pi\}$ is called the reproducing kernel of H. Namely, the Berezin symbol have been investigated in detail for the Toeplitz and Hankel operators on the Hardy and Bergman spaces; it is widely applied in the various questions of analysis and uniquely determines the operators. In this talk, we would like to state more extensions of Berezin number inequalities. Moreover, we obtain several Berezin number inequalities for 2×2 operator matrices.

Keyword(s): Berezin number, Berezin symbol, Heinz means, Off-diagonal part, Operator matrix, Positive operator.

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On The Stability of A Nonlinear Difference Equation

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In this paper, our aim is to study the stability of following difference equation $x_{n+1} = \frac{\gamma x_{n-2}}{Bx_n + Dx_{n-2}}$. Moreover we investigate the boundedness and convergence of solutions of related difference equation.

Keyword(s): Difference equations, stability, boundedness
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The Spectrum of New Type Boundary Value Problems

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Sturm-Liouville type boundary value problems arise throughout in physics, engineering, electromagnetics, elasticity and other branches of natural sciences. For example, they describe the energy eigenfunctions of a quantum mechanical oscillator, the vibrational modes of a various systems, the heat and mass transfer problems and etc.

Usually, the eigenvalue parameter appears linearly only in the differential equation of the classic Sturm-Liouville problems. However, in solving of many significant physics problems the eigenvalue parameter appear also in the boundary conditions. There is quite substantial literature on such type problems.

Moreover, Sturm-Liouville problems with the eigenvalue parameter in boundary conditions together with additional transmission conditions at some interior points of interaction arise in various problems of applied mathematics. Note that boundary-value-transmission problems arise in diffraction problems, in vibrating string problems, when the string loaded additionally with point masses and etc.

This study deal with a new type boundary-value-transmission problems for many-interval Sturm-Liouville equations. For self-adjoint realization of the considered problem we define alternative inner product in the Lebesgue space of square-integrable functions. We shall establish some properties of the spectrum.

Keyword(s): Boundary-value problem, eigenvalue, eigenfunction, Hilbert space.

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Experimental Study Based Regression Analysis Model

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The objective of this experimental study is to define an optimal formulation by developing a model based on regression analysis and a mathematical formulation. In this study, our work results in sand substitutions and crushed shells, with different percentages 20%; 25%; 35%; 40% and 50%. Regression analysis conducted with different test to ascertain the results obtained.

Keyword(s): Regression analysis; Mathematical model; Experimental study

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Controlled Hodgkin-Huxley Network Model for Suppressing Epileptic Seizes Detected from the Intracranial EEG Signals

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Abstract

Hodgkin-Huxley (HH) mathematical neuron model describes the formation and propagation of action potentials along the axons due to the change of intra- and extracellular concentration of ions passing through the membrane lipid bilayer. HH cells demonstrate the variety of nonlinear dynamical regimes including single spikes, spiking trains and bursting.

The individual neuron-based control elements in small HH clusters developed by Borisenok, Çatmabacak, Ünal (2018) are capable to detect a hypersynchronized epileptiform behavior of the cluster and efficiently suppress it by sending feedback signals to other network elements. Here we extend our approach with the more realistic case of network links where the neurons form a memory trace with the effect of synaptic consolidation, covering the contribution from the neurotransmitter release.

We discuss the perspectives of the intracranical electroencephalogram (EEG) modeling. EEG is recorded from the electrodes implanted into the epileptic focus and represent the total activity for a large number of neurons rather than the impulse activity of stand-alone ones. The EEG data we use include both pre-ictal and ictal phases. The goal of modeling is to identify the pre-ictal phase (or, at least, its beginging) in the observed EEG and design the electrode control stimulus acting on the tissue to suppress the seizure.

Thus, the controlled Hodgkin-Huxley network proposed here can be implemented for modeling the epileptic seizes suppressing by electrical stimulating through the electrode from which the intracranial EEG signal is observed.

Keywords: Epileptiform Behavior, Hodgkin-Huxley Neurons, Control in Small Networks, Intracranical EEG

Acknowledgement: Study was supported by the RFBR grant # 18-013-01086.

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The Varchenko determinant for oriented hyperplane arrangements

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In this study we will examine a hyperplane arrangement $\mathcal{A}$ in a real affine space, based on Varchenko's paper [1]. Therefore, we will explain its main objects such as a domain, an edge, a vertex, an intersection poset, as well as some of its basic properties. We will first define the weight of the hyperplane and the weight of an edge, and then the quantum bilinear form of the arrangement $\mathcal{A}$. Of particular interest is the Varchenko's theorem that provide the formula for determining the determinant of the bilinear form of the arrangement $\mathcal{A}$. Moreover, our study will be presented on oriented real arrangements in a real affine space. Furthermore, we will introduce the orientation of a real arrangement by the unit normal vector $\mathbf{n}_i$ to a hyperplane H_i. Consequently, the hyperplane H_i divides an affine space into three parts: to the hyperplane itself, to the open half-space containing $\mathbf{n}_i$ and to the open half-space that does not contain $\mathbf{n}_i$. Then to every open half-space is assigned the appropriate weight. Further, the weight of an edge L^* of oriented real arrangement is defined as the product of the weights of all open half-spaces whose closures contain the edge L^*. Here we have first taken into account that every hyperplane can be obtained as the intersection of the closures of the half-spaces containing it, and then that each domain of oriented arrangement can be taken as a nonempty intersection of corresponding open half-spaces. Then, with respect to the basis of domains, the entries of the quantum bilinear form of a real oriented arrangement will be monomials composed of weights of the corresponding open half-spaces that contain one domain and do not contain other domain of any pair of domains. Given the fact that the entries of the quantum bilinear form of a real arrangement are monomials composed of weights of all the hyperplanes separating any pair of domains, here we have linked a set of variables of weights of hyperplanes with two sets of variables consisting of weights of open half-spaces that are distinguished between crossing a hyperplane in the positive versus the negative direction.

[1] A.N. Varchenko, *Bilinear form of real configuration of hyperplanes*, Adv. Math. **97** (1993), 110-144.

Keyword(s): a hyperplane arrangement, an intersection poset, a quantum bilinear form, the Varchenko determinant, oriented arrangements
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B-Spline wavelets for solving Troesch problem

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A new and applicable approach based on cubic B-spline wavelets and converting two-point boundary value problem to Fredholm Urysohn integral equation is purposed for solving Troesch problem. Troesch's problem is a special nonlinear two point boundary value problem, defined as

$$v''(x) - \lambda \sinh\big(\lambda\, v(x)\big) = 0, \quad 0 \le x \le 1, \tag{1}$$

subject to the following conditions

$$v(0) = 0, \qquad v(1) = 1, \tag{2}$$

where Troesch parameter λ is a positive constant. Existence of the solution of (1)-(2) is proved for λ < 5. The closed form solution to this problem in terms of the Jacobian elliptic function has been given as

$$v(x) = \frac{2}{\lambda}\sinh^{-1}\Big(\frac{v'(0)}{2} sc\ (\lambda x|1 - \frac{1}{4}v'(0)^2)\Big).$$

In the introduced method we integrate equation (1) two times, so we get

$$v(x) = xv'(0) + \int_0^x (x-t)\sinh\big(\lambda v(t)\big)\, dt, \tag{3}$$

for evaluation $v'(0)$ in equation (36) we put $x = 1$ and get

$$v'(0) = 1 - \int_0^1 (1-t)\sinh\big(\lambda v(t)\big)\, dt,$$

partitioning the integration interval to $[0, x]$ and $[x, 1]$ and substituting the result in equation (3),

$$v(x) = x + \int_0^1 \Delta\big(x, t, v(t)\big)dt,$$

$$\Delta\big(x, t, v(t)\big) = \sinh\big(\lambda v(t)\big)\begin{cases} t(x-1); & 0 \le t \le x \\ x(t-1); & x \le t \le 1 \end{cases}.$$

Now cubic B-spline wavelets and Simpson quadrature are employed for solving the obtained integral equation. Purposed method is new and computationally attractive and applications are demonstrated through illustrative examples. Comparison the results of presented method with the results of some other exiting methods for solving this kind of equations, show the high accuracy and efficiency of suggested schemes.

Keyword(s): Troesch problem, cubic B-spline wavelets, Urysohn integral equation, Simpson quadrature

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On the Construction of Intrinsic Metric on the Added Sierpinski Triangle

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The Sierpinski gasket is a basic model for the classical fractals and there are different studies on this set. To define the intrinsic metric by using the code representations of the points on this fractal is an interesting subject. The intrinsic metrics on the code sets of the Sierpinski tetrahedron and the Vicsek fractal also are formulated in some works. But, there are not many studies about the intrinsic metric defined on the code set of fractals in the literature. In this presentation, we construct geometrically the intrinsic metric formula on the added Sierpinki triangle, whose iterated function system has different contraction factors, by using the code representations of the points of it. Moreover, we give some geometrical properties of this fractal which is equipped with its intrinsic metric and then we compare these properties between the Sierpinski gasket and the added Sierpinski triangle.

Keyword(s): Fractal, the added Sierpinski triangle, intrinsic metric, code representation.
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Extreme Theory Approach For Estımatıng New Condıtıonal Taıl Expectatıon

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Abstract. Several risk measures play an important role in the evaluation of actuarial and financial risks, we focus on the conditional tail expectation (CTE), see Denuit et al (2006). CTE is the average amount of loss, given that the loss exceeds a specified quantity. That is, this risk measure gives information on the distribution of the random loss variable beyond the α order quantile and thus on the thickness of the distribution tail. As a result, CTE provides a measure of capital required because of exposure to loss and is therefore used to measure risk. It is therefore not surprising that CTE continues to receive increased attention in the actuarial and financial literature, where we also find its many extensions and generalizations.

The contribution in our work is to derive a new estimator of the conditional tail expectation in the case of heavy tailed losses, it's an improvement of the work of Girard, S. and Armelle, G. (2015).

The determination of this new estimator, proving its robustness and establishing the asymptotic normality, they are the objectives to which one aspires.

Keyword(s): t-Hill estimator, robust estimator, conditional tail expectation

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INTERNATIONAL CONFERENCE ON MATHEMATICS
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A New Technique for Solving Linear and Nonlinear Third Order Fractional Differential Equations

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Abstract: In this work, reproducing kernel Hilbert space method has been applied to get the solution of the third order fractional differential equation. Numerical experiments have given to prove the power of the method. Some useful reproducing kernel functions have been found in some special Hilbert spaces.

Keywords: Reproducing kernel Hilbert space method, third order fractional differential equation, numerical solution.

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A New Class of Soft Topological Space via (1,2)*- Soft b-open Set

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In this study, firstly, the properties of soft sets, (1,2)*- soft b-open sets and (1,2)*- soft b-closed sets, which are needed for the definition of (1,2)*- soft b-extremally disconnected space, are studied for soft bitopological spaces and some important results are given. Secondly, the characterization of (1,2)*-soft b-extremally disconnected bitopological spaces is presented. In particular, the relation between (1,2)*-softdense and (1,2)*- soft b-open set is obtained. In the last section of this text, the properties of (1,2)*- soft b-submaximal space are studied using by (1,2)*- soft dense sets.

Keywords: (1,2)*- soft b-open sets, (1,2)*- soft dense sets, (1,2)*- soft b-submaximal space, (1,2)*- soft b-extremally disconnected space.

Acknowledgement: Known concepts are mentioned in the text along with appropriate references.

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An Approximation for Hadamard fractional derivative

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In this study, we consider the left-sided Caputo-Hadamard fractional derivative of order

$$({}^{C}D_{1^{+}}u)(x) = \frac{1}{\Gamma(2 \quad)} \int_{1}^{x} \log \frac{x}{} \quad {}^{1} \quad {}^{2}u(\ ) \frac{d\xi}{}, \ 1 < \alpha < 2, 1 \quad x \quad e \quad (1)$$

where $= x\frac{d}{dx}$ and $u(1) = 0; u(1) = 0:$ A second order approximation for (1) is obtained by using a new spline function that interpolates ${}^{2}u(x)$ where u is in C^{4} [1;e] = f$u(x)$: ${}^{k}u(x)$ 2 $C[a;b]; k$ = 0;1;:::;4g. Finite di/erence method is implemented for the space-fractional di/erential equation with boundary conditions. Second order accuracy is obtained in time and space variables.

Keyword(s): Hadamard fractional derivative, nonpolynomial spline, nite di/erence.

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Properties of Hyperbolic Split Semi Quaternions and Their Matrices

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In this study, we work on hyperbolic split semi quaternions and matrices which entries are hyperbolic split semi quaternions. We examine the basic facts about hyperbolic split semi quaternions and give the properties of hyperbolic split semi quaternion matrices. Also, we investigate the properties of real split semi quaternion matrix representation of a hyperbolic split semi quaternion matrix.

Keyword(s): Split semi quaternion, Hyperbolic split semi quaternion, Hyperbolic split semi quaternion matrix

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Synthesis, characterization and application of ZnO nanocomposite supported on activated carbon for photocatalytic degradation of methylene blue

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In this study, Activated carbon prepared from abricot stone was employed in the synthesis of carbon supported ZnO photocatalyst (ZnO/ACAS). The ZnO/ACAS nanostructure was characterized by Fourier transform infrared spectroscopy, X-ray diffraction and scanning electron microscopy that confirmed achieving of ZnO nanoparticles. The efficiency of the catalyst was evaluated in the photocatalytic decomposition of aqueous solution of methylene blue (MB). Major parameters such as pH, dose of catalyst, stirring effect, initial concentration of dye effect were considered. Kinetic studies showed significant fit to the pseudo second order kinetic model ($R^2 \geq 0.997$). The experimental adsorption data were better fitted with the Langmuir isotherm model than with the Freundlich isotherm model.. High adsorption capacity, reusability, fast kinetics and simple synthesis method indicate that prepared nanocomposite can be suggested as a high-performance adsorbent for MB removal from polluted water.

Keywords:

Zinc oxide, Activated carbon, Photodegradation, Methylene blue

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About Asymptotıc Of Eıgenvalues On Graph-Star

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In this paper nondegenerated by V.A. Marchenko and Birkhoff regular boundary conditions for double differentiation operator on a graph-star are highlighted. Moreover asymptotics of eigenvalues of double dierentiation operator on graph-star with Birkhoff regular boundary conditions are constructed and the completeness of the system of root functions of considering operator in the space $L_2(\mathfrak{I})$ is proved. An operator with nondegenerated boundary conditions may have non complete system of root functions in $L_2(\mathfrak{I})$. At the same time an operator with Birkhoff regular boundary conditions has complete system of root functions in $L_2(\mathfrak{I})$. Illustrative examples are presented.

Key words: Birkhoregular boundary conditions, eigenvalues, Kirchhoconditions, graph-star, asymptotics.

Acknowledgement: The work was supported by grant of Ministry of Education and Science of the Republic of Kazakhstan (2018-2020).

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Unbounded Pseudonorm Convergence on Vector Lattices

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Recently, various types of unbounded convergence in vector lattices were introduced and investigated. Some of them are topological, others are not. In the present talk let X be an Archimedean vector lattice X and ρ be a pseudonorm on X. Then (X,ρ) is called a pseudonormed vector lattice. We establish unbounded pseudonorm convergence on X and investigate the relations with order convergence. Several basic facts are also stated.

Keyword(s): Vector lattice, Banach lattice, pseudonorm, Riesz pseudonorm, unbounded pseudonorm

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The *(p,q)*-Chebyshev polynomial coefficients for a certain subclass of analytic and bi-univalent functions

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In the present investigation, we consider the *(p,q)*-Chebyshev polynomials to find upper bounds for a certain subclass of analytic and bi-univalent functions. We also determine the Fekete-Szegö functional for functions in this class.

Keywords: *(p,q)*-Chebyshev polynomials, coefficient estimates, analytic functions, bi-univalent functions, subordination.

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New Solutions to the Rhoades' Open Problem and the Fixed-Circle Problem

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In this talk, we give a new solution to the Rhoades' open problem on the discontinuity at fixed point in the setting of an S-metric space which is a recently introduced generalization of a metric space. To do this, we modify the notion of a Zamfirescu mapping. Also, we consider a recent problem called as "fixed-circle problem" and propose a new solution to this problem.

Keyword(s): Discontinuity, S-metric, fixed point, fixed-circle problem.
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Existence of solutions for a perturbed second order problem on the half-line via Ekeland variational principle

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In this paper the authors discuss the existence of nontrivial solutions of a perturbed second order problem on the half-line by Ekeland variational principle.

Keyword(s): Ekeland's principle, critical point, existence of solutions, perturbed.

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Prediction Model of Tensile Properties of Ball -Burnished S355JR Steel

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Various statistical and mathematical model including regression, Taguchi method, response surface methodology (RSM), and the analysis of variance (ANOVA) have been used to predict and optimize the output burnishing response.

This work focuses on the application of burnishing S355JR steel by diamond-tip active part. The considered process parameters are burnishing force (P) and number of tool passes (i). The experiment was performed using full factorial methodology to develop a mathematical model and optimize the parameters for the tensile properties such as yield strength (Re), tensile strength (Rm) and ultimate elongation (A%).

A combination of the two parameters was released according to the full factorial methodology with a complete 22 type design. A linear model for predicting output responses was also established.

Linear regression model was used to predict the output responses. The effect of each of both input factors (P) and (i) as well as their interactions were investigated and analyzed. Results show that burnishing has a beneficial effect on the physical state of the material given the increase in the tensile strength of the material despite a modest reduction of the yield strength up to 11.87% and a reduction from the ultimate elongation of 12.3% to the worst case.

An optimal solution combining burnishing force P = 10 kgf with a number of tool passes i = 3 resulted in an increase in the tensile strength (Rm) of 4.22% without greatly affecting the ductility of the material.

Keyword(s): Steel S355 JR, burnishing, tensile properties, full factorial methodology

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Polynomial decay rate for the dissipative wave equation with mixed boundary conditions

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In this presentation, we analyze the polynomial stability [1,2,3,4] of the dissipative wave equation with mixed boundary conditions. This system is not exponentially stable. Here using a spectral theory , a Fourier analysis and the multipliers method, we show that the solution of this system decays polynomially.

Keyword(s): Stabilization, Semigroup theory, mixed boundary conditions, Fourier-analysis, spectral theory.

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On $\varphi - recurrent\ Kenmotsu\ Manifolds$

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The object of the present paper is to study pseudo-projective $\varphi-$recurrent and concircular $\varphi-$recurrent Kenmotsu manifolds.

Keyword(s): Kenmotsu manifold, pseudo-projective curvature tensor, concircular curvature tensor.

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On testing the new two parameters distribution with right censoring

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Among new models proposed by researchers, a new distribution with two parameters introduced recently by Doostmoradi and Chamran is very interesting. Having an increasing, decreasing and unimodal failure rates function, this distribution can be used instead of several generalized models. In this work, we propose the construction of modified goodness-of-fit statistic tests for this model when data are right censored and the parameters are unknown and estimated by maximum likelihood method. An important simulation study was carried out and theoretical results obtained through this study are applied to real data.

Keyword(s): Censored data, Fisher information matrix, maximum likelihood estimation, modified goodness-of-fit test.
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Weak demicompactness involving measures of weak noncompactness and invariance of the essential spectrum

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In this paper, we show that an unbounded weakly S_0- demicompact linear operator T, introduced in [4], acting on a Banach space, can be characterized by some measures of weak noncompactness. Moreover, our results are illustrated to discuss the relationship with Fredholm and upper semi-Fredholm operators as well as the stability of the essential spectrum of T.

Keywords: Weakly demicompact operator, Fredholm and semi-Fredholm operators, measure of weak noncompactness, essential spectrum.

Mathematics Subject Classification: 47A53, 47A10.

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Applications of Rotation Minimizing Vector Fields on Curves and Surfaces in Minkowski Space

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In this paper, in Minkowski Space, we study the conditions of non-rotating frame and Fermi-Walker parallel according to the Fermi-Walker derivative, when a general frame is given. We also give a different perspective to the Normal Fermi-Walker derivative. In addition, we show that these Rotation minimizing vector fields are non-rotating in their linear composition according to the Fermi-Walker derivative.

Keyword(s): Rotation minimizing frame (RMF); Fermi-Walker Derivative; Fermi-Walker Parallelism.
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Flow topology around the re-entrant corner in an L-shaped cavity

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The problem of examining the flow structures around the re-entrant or salient corner point is quite common. The reason of this is the singularity of the sudden angular change around the corner. A number of studies have been conducted so far to eliminate this singularity and improve the flow structures around the corner point. One of these studies is to pair numerical-asymptotic solutions with the help of the least square method. With this method, the velocity vector components obtained numerically or analytically in non-singular points are mapped with the faster convergent Moffatt polar solution around the corner. Thus, the topological properties of the flow around the singular point are revealed. The developed numerical procedure is then used to find the flow topology in the vortex formation mechanism of the L-shaped cavity.

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

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Existence of optimal relaxed controls for mean-field stochastic systems

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We study the existence of an optimal control for systems governed by stochastic differential equations of mean-field type. In these equations, the drift and the diffusion coefficient depend not only on the state of the system, but also on the expectation of some function of the state. For nonlinear systems, we prove the existence of an optimal relaxed control, by using tightness techniques and Skorokhod selection theorem. In the case where the coefficients are linear maps and the cost functions are convex, we prove by using weak convergence techniques the existence of an optimal strict control, adapted to the initial filtration
Keyword(s): Mean-field stochastic differential equation; relaxed control; strict control; weak convergence ; tightness.

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On The Stability Analysis of a System of Difference Equations

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During this study we investigate the stability analysis of following system of difference equations $x_{n+1} = x_{n-1}y_n - 1, y_{n+1} = y_{n-1}x_n - 1$. Furthermore we research the boundedness of solutions of this system.

Keyword(s): Difference equations, stability, boundedness, dynamical systems
Acknowledgement:

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On linearized Florin type problem for the system of parabolic equations

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The linearized Florin type problem for the system of parabolic equations is studied. The original nonlinear free boundary problem of Florin type describes the process of filtration of liquids and gases in the porous medium. There are proved in the Holder space the existence, uniqueness and uniform coercive estimates of the solution with respect to the small parameters.

Keyword(s): parabolic equations, existence, estimate, uniqueness of the solution, coercitive estimates, Holder space.
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Improving Election Algorithm for numerical function optimization

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In this research, an improved version of election algorithm is presented. Election algorithm is a swarm intelligence and population-based approach, which inspired from the presidential election process. This algorithm starts its optimization process with a population of candidate solutions, which every solution is called a person. The individuals in the population are divided into voters and candidates, which form some electoral parties in the solution space. Then, using three operators of positive advertisement, negative advertisement and coalition, the electoral parties explore the solution to reach a global optimum point. The election algorithm suffers from two important problems: (*i*) the low speed of the algorithm due to the calculation of Euclidean distance between candidates and voters at the party creation and positive advertisement phases; (*ii*) no convergence to the global optimal point due to inappropriate exploration of the search space in the positive advertisement stage. In this research, to alleviate the problem of low speed, instead of computing the Euclidean distance in party creation and positive advertisement phases, the random selection strategy is used. A new version of positive advertisement operator is proposed, which is able to combine the knowledge of voters and candidates to explore solution space. The proposed algorithm is evaluated on 20 test functions and compared with other algorithms. The experimental results show that the proposed algorithm has better performance in comparison to state-of-the-art algorithms.

Keyword(s): Optimization, election algorithm, improved election algorithm, positive advertisement
Acknowledgement:

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Discriminant Analysis: Log-normal Distribution

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The Log-normal distribution is a widely used probability distribution model for modeling the data from many areas such as failure times in reliability or lifetime of individuals in lifetime models. In the present study, the discriminant analysis problem between two Log-normally distributed populations is discussed. In the study, by using maximum likelihood estimators of the unknown parameters of the distributions, classification regions, discriminant function, and optimal classification rule are obtained according to the classification rule of minimizing the total probability of misclassification. A comprehensive Monte-Carlo simulation study is conducted to show how the error rate is affected according to the obtained discriminant function, and simulated error rates are provided.

Keyword(s): Log-Normal distribution**,** discriminant analysis, error rate, misclassification.

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h Fourier integral operators with complex phase

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We prove in this work that h Fourier integral operators with particular complex phase, are continuous on S (R^n) and S0 (R^n):

Let consider a h Fourier integral operator with a complex phase

$$(I(a,\phi;h)f)(x) = \int_{\mathbb{R}^n}\int_{\mathbb{R}^N} e^{\frac{i}{h}\ (x,\theta,y)} a(x,\theta,y)\, f(y)\, dyd\theta,$$

where (x;y;) 2 C1 R^n R^N R^n;C and the amplitude a(x;;y) 2 C1 R^n R^N R^n , h being a semiclassical parameter.

Set (x;y;) = S (x;) y; with $S = S_1 + iS_2 \in C^\infty(\mathbb{R}^n_x \quad \mathbb{R}^n;\mathbb{C})$,

$(x,\theta,y) = \quad 1+|x|^2+|y|^2+|\ |^2 \quad ^{1\ 2} =$,
and suppose that:

(G_1) For all (;) 2 N^n N^n, there exist $C_{;} > 0$, such that

$@_x\, @$ S (x;) $C_{;}$ (x;)$^{(2}$j jj j$^{)}$:

(G_2) There exists $_0 > 0$ such that $\inf_{x,\theta\in\mathbb{R}^n} \det \frac{\partial^2 S}{\partial x\partial\theta}(x,\theta) \quad _0$:

(G_3)8(x;) 2 R^n R ^{N};S_2 (x;) 0:

Theorem 1 Let F_h be an integral operator of the form

(F_h)(x) = (2h) ^{n} Z Z e$h^{i(S(x;)\ y)}$a(x;) (y)dyd:

and S satises (G_1);(G_2); and (G_3):Then F_h can be extended to a linear continuous operator from S (R^n) into itself, and from S0 (R^n) into itself.

Keyword(s): Fourier integral operator, complex phase, boundedness.

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On dynamics of Lotka–Volterra prey–predator planar map

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Abstract:

The essential motivation of this leter is devoted to the bifurcation analysis of a new two dimensional discrete Lotka Volterra prey predador system. Basic and interesting analysis properties of the planer map have been presented. The dynamical behavior of the new planer map was presented in detail trough both theoretical and numerical simulation.

Keywords: Stability conditions, properties, bifurcation, 2-D discrete Lotka-Volterra prey–predator map, numerical simulation.

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Linear SH Waves in a Two-Layered Plate

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In the present paper, we investigate the propagation of linear shear horizontal (SH) waves in a two-layered plate of uniform thickness with 2h. Let the material coordinates be such that (X, Y, Z). The top layer takes place between Y = 0 and Y = h; and, the bottom layer takes place between Y = -h and Y = 0. We assume that the constituent materials of the top layer are heterogeneous, isotropic, and generalized neo-Hookean and the constituent materials of the bottom layer are homogeneous, isotropic, and generalized neo-Hookean. Therefore, the strain energy function of top layer is an isotropic function of the first invariant of Finger's deformation tensor and Y and the strain energy function of bottom layer is an isotropic function of the first invariant of Finger's deformation tensor. We also assume that the free boundaries Y = -h and Y = h are free of traction and stresses and displacements are continuous at the interface Y = 0. Now, we suppose that an SH wave is to propagate along the X-axis with the displacement in the Z-direction. The displacements of particles at a moment t can be given by u = u(X, Y, t) in the top layer and v = v(X, Y, t) in the bottom layer. In the absence of body forces, the equations of the motion can be given with the boundary conditions. Under some consideration, plugging the harmonic wave solutions into the boundary conditions, then we obtain the dispersion relation that is consistent with the literature [1]. We discuss the effect of heterogeneity on the propagation characteristic of waves via the dispersion relation.

Keyword(s): Heterogeneous plate, linear SH waves, dispersion curves.

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On Construction of the Comparison Function of Program Manifold of the Stochastic Differential Equations

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The set of first-order Ito stochastic differential equations and set of comparison functions are constructed. There is stability in probability of the given program motion with respect to comparison functions.

It is required to construct the corresponding set of equations of motion for the material system

$$\dot{y} = Y(y,t) + \sigma(y,t)\dot{\xi},\ \ \xi \in R^k, \tag{1}$$

by the given program of motion

$$\Lambda: \lambda \equiv y - \phi(t) = 0,\ y \in R^n,\ \ \phi \in C^1,\ \ \|\varphi\| \le l. \tag{2}$$

Here $\xi(t) = w(t) + \int_{R^n} c(y)P(t,dy)$ is random process with independent increments. $w(t)$ is Wiener process, $P(t,A)$ is Poisson process as a function of t and Poisson stochastic measure as a function of set A. $c(y)$ is vector function mapping R^n into the space of the process values $\xi(t)$ for all t.

Let the considering equations be the class of equations admitting the existence of a unique up to stochastic equivalence of solution of the equation (1) with initial condition $y\big|_{t=t_0} = \varphi(t_0)$. Assume that there is a set of n-dimensional vector functions $Q(y)$. $Q(y)$ is holomorphic vector functions in some ε - neighborhood $\Lambda_\varepsilon = \{\|y - \phi(t)\| < \varepsilon\}$ of the program manifold (2) for all $t \ge t_0$. There is stability in probability of the program motion (2) with respect to $Q(y)$.

Keyword(s): stochastic differential equation, stability in probability, comparison function.
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Solution of third-order boundary-value-transmission problems by differential transform method

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A great deal of interest has been focused on the applications of the differential transform method (DTM) to solve many problems appearing in physics and engineering. For example, DTM has been used to solve differential-difference equations, delay differential equations, differential algebraic equations, integro-differential systems and etc.

A numerical method based on the differential transform method is introduced in this work for the approximate solution of one third-order boundary-value-transmission problem. Namely, we investigate the differential equation,

$$y'''(t) + y(t) = 0, \qquad t \in [0, \tfrac{1}{2}) \cup (\tfrac{1}{2}, 1]$$

subject to boundary conditions at the end-points x = 0,1 given by

$$y(0) = 0, \quad y'(0) = 1, \quad y(1) = 0$$

and additional transmission conditions at the interior singular point $\mathrm{t} = \frac{1}{2}$ given by

$$y\left(\tfrac{1}{2} - 0\right) = y\left(\tfrac{1}{2} + 0\right), \quad y'\left(\tfrac{1}{2} - 0\right) = y'\left(\tfrac{1}{2} + 0\right), \quad y''\left(\tfrac{1}{2} - 0\right) = ky''(\tfrac{1}{2} + 0).$$

The main objective of this study is to present the usage of DTM to investigation of discontinuous problems involving an additional transmission conditions. First, we will find solution of the problem in the left interval $t \in [0, \frac{1}{2})$. Then, we will investigate solution of the problem in the right interval $(\frac{1}{2}, 1]$. Finaly, we find the approximate solution of the main problem on whole interval.

Keyword(s): Transmission conditions, differential transform method, approximate solution.

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Delta-systems (strong and weak) with partitions of an integer

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A study on weak systems (strong respectively) and partitions an integer will be the objective of this paper. We underline that this research is motivated by the Erdös-Lovász conjecture, relating to the Delta systems one of the more interesting conjectures solved by Michel Deza, using the theory of codes, known in the literature by its different applications, in operational research and in algebra.
In this paper, we introduce the notion of Delta-systems (strong and weak) and apply it to the partitions of an integer in distinct parts. We present some results and some perspectives.

Keyword(s): : Partition of an integer, Δ-systems.

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Bifurcation Problem For A Class Of Quasilinear Fractional Schrodinger¨ Equations

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We study the bifurcation problem for fractional Schrodinger¨ equation

$$\begin{cases} (-\Delta)^s u + V(x)u = \lambda f(u) & \text{in}\Omega \\ u = 0 & \text{in}R^n \setminus \Omega \end{cases}$$

where $0 < s < 1$, $n > 2s$, Ω is a bounded smooth domain of R^n, $(-\Delta)^s$ is the fractional Laplacian of order s, V is the potential energy satisfying suitable assumptions and λ is a positive real parameter. The nonlinear term f is a positive nondecreasing convex function, asymptotically linear that is $\lim_{t\longrightarrow+\infty} \frac{f(t)}{t} = a < +\infty$. We discuss the existence, uniqueness and stability of a positive solution and we also prove the existence of critical value and the uniqueness of extremal solutions. We take into account the types of Bifurcation problem for a class of quasilinear fractional Schrodinger¨ equations, we also establish the asymptotic behavior of the solution around the bifurcation point.

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p-Martingales on Lattice Normed Vector Lattices

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A measure free approach to stochastic processes has been developed for a long time. Various order theoretic settings for stochastic processes is given. In this talk, we introduced the concepts of conditional expectations and pmartingales on lattice-normed vector lattices. Here we formulate and prove p-theoretic analogue of the Hopf ergodic theorem in a measure free context.

Keyword(s): Lattice-normed vector lattices, conditional expectation, p-martingales

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New DNA codes from additive self-dual F_4-codes

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Coding theory has several applications in Genetics and Bioengineering. Every DNA molecule consists of two complementary strands which are sequences of four different nucleotide bases: adenine (A), cytosine (C), guanine (G) and thymine (T). The problem of designing DNA codes (sets of words of fixed length n over the alphabet {A, C, G, T} that satisfy certain combinatorial constraints has applications for reliably storing and retrieving information in synthetic DNA strands. A **DNA code of length *n*** is a set of codewords of type (x_1, …., x_n) with $x_i \in$ {A, C, G, T}. Let $F_4 = \{0,1,\omega,\omega^2\}$ be the finite field of four elements where $\omega^2 = \omega + 1$. An additive F_4-code of length n is an additive subgroup of F_4^n. An additive (n, 2^k) F_4-code is a code of length n which contains 2^k codewords. The weight of a vector x is the number of nonzero components of x and the minimum weight of a code is the smallest weight among all nonzero codewords of this code. An additive (n, 2^k) F_4-code having minimum weight d is called an additive (n, 2^k, d) F_4-code.

In this work we represent a method for constructing DNA codes from additive self-dual F_4-codes (we use a map $0 \to$ A, $1 \to$ T, $\omega \to$ C, $\omega^2 \to$ G). By this method, using the results presented in [1] and some methods for shortening/lengthening of additive F_4-codes, we construct new DNA codes of lengths from 40 to 48 that satisfy some certain constraints (Hamming distance constraint, reverse-complement constraint, and GC-content constraint) for Hamming distance d between 12 and 14.

Keyword(s): DNA code, additive self-dual code

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Some existence results of fractional boundary value problems

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In this study, some theorems that prove the existence of solutions of fractional boundary value problems will be given according to a certain rule with different definitions of fractional derivatives used in the problem types encountered. Therefore, it will be possible to have an idea about the solvability of the problem to be studied.

Keyword(s): Boundary value problem, fractional calculus, existence of solutions.

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Super decisions for the influenza activity viruses using AHP and ANP methods

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Nowadays we are very interested about the infections caused by different viruses, to know the most activity spread during years and to make predictions for the future. According to the world health organization WHO online data updated every week, we can evaluate the seasonal influence activity of viruses A, B and their subtypes. We will propose a decision-making model based on two methods AHP and ANP. According to the decision-maker Goal, we can choose the most spread virus by his activity. There are 5 types of activity according to one year of study: no activity, sporadic, local outbreak, widespread outbreak, regional outbreak. The software used is "Super Decision" version 2.10. In fact we can`t agree that one method is better than another because it depends on the purpose of the problem. We will see results in both methods and we will make their comparisons in each case. Generally in the last 10 years, the two methods show that the priority activity in general in each season is no activity, and the more spread virus is AH_1N_1.

Keywords: Super decisions, AHP, ANP, influenza virus activity, pairwise comparisons.

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On the Spectrum of Dissipative Singular Differential Operators of First Order

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In this paper, firstly all maximally dissipative extensions of the minimal operator generated by first order linear singular differential expression in the weighted Hilbert space of vector-functions on right semi-axis are described. Later on, the structure of spectrum set of these extensions has been researched. Then, the obtained results are supported by application.

Keywords: Dissipative operator, Deficiency index, Space of boundary values, Spectrum

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Compact Inverses of First Order Normal Differential Operators with Lorentz-Schatten Properties

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In this work, the Lorentz-Schatten properties of the compact inverses of normal extensions of a minimal operator generated by linear differential-operator expression for first order in the weighted Hilbert space of vector-functions on right semi-axis is investigated.

Keywords: Differential and normal operators, s-numbers of compact operator, Lorentz-Schatten operator classes

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Performance Evaluatıon of Unıversıty Academıc Staff ın teachıng, research, and servıce usıng MCDA method and AHP

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Abstract

The aim of the education system is the continuous and progressive preparation of students' skills so that they can contribute to the sustainable development of their country. Among the different levels of education, university education plays a very important role in completing basic knowledge and methods of scientific research for their best performance and success in the future. The university education performance, results and success largely depends on the quality of programs, performance of the lectors, student's achievements, and academic services. The Albanian universities have completed successfully their accreditation process by the Albanian Quality Assurance Agency for Higher Education (ASCAL), while it is the process of accreditation of bachelor and master programs. Still, Albanian universities need to perform better and have higher expectations. Albanian universities are always under the "watch" of international academic community ranking. And, to our disappointment, Albanian universities are behind universities of Balkan neighboring countries. It needs a lot to be done. The process of academic staff evaluation should be a daily concern for the higher education Institutions as it is a very useful procedure which will help faculties and universities to have useful information about academic activities, qualifications, and projects, teaching process, achievements, and problems. Performance evaluation includes academic achievement, publications and projects, scientific research, teaching process, student's evaluations, and other activities, inside or outside the university area. Regular evaluation creates a healthy competition among university lectors. But, for correct and successful evaluation, it is necessary to develop a performance-based, structured and effective evaluation model. The purpose of this study is to develop some performance indicators and an evaluation mechanism to evaluate the lectors'performance of a math department with respect to those indicators. Criteria and factors will be evaluated through the method of pairwise decision analysis. The Analytical Hierarchy Process (AHP) will be used to determine the weights of those performance indicators and, after evaluating alternatives for each criterion, we will have the rankings of alternatives which is the purpose and the outcome of our study.

Keywords: academic, evaluation, performance, ahp, mcda, university.

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The use of partial least squares structural equation modeling approach for analysis of the dimensions of poverty, a case study of Albania.

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Abstract

Partial Least Squares Structural Equation Modeling (PLS-SEM) is a multivariate analysis technique for modeling the relations in several fields of knowledge including dimensions of poverty. The purpose of this article is to operationalize living conditions, social inclusion, education, expenditures as poverty dimensions with a view to understanding the links between them. The data is derived from Living Standards Measurement Survey (LSMS) 2012. The results show that education has a positive impact on expenditures and social inclusion. Relationships in structural models between latent dimensions are significant. Measurement models indicate allowed values for internal consistency, reliability, validity. Our findings support as instruction for PLS-SEM implementation in multidimensional poverty analysis.

Keywords: partial least squares structural equation modeling, LSMS, latent dimension, measurement models.