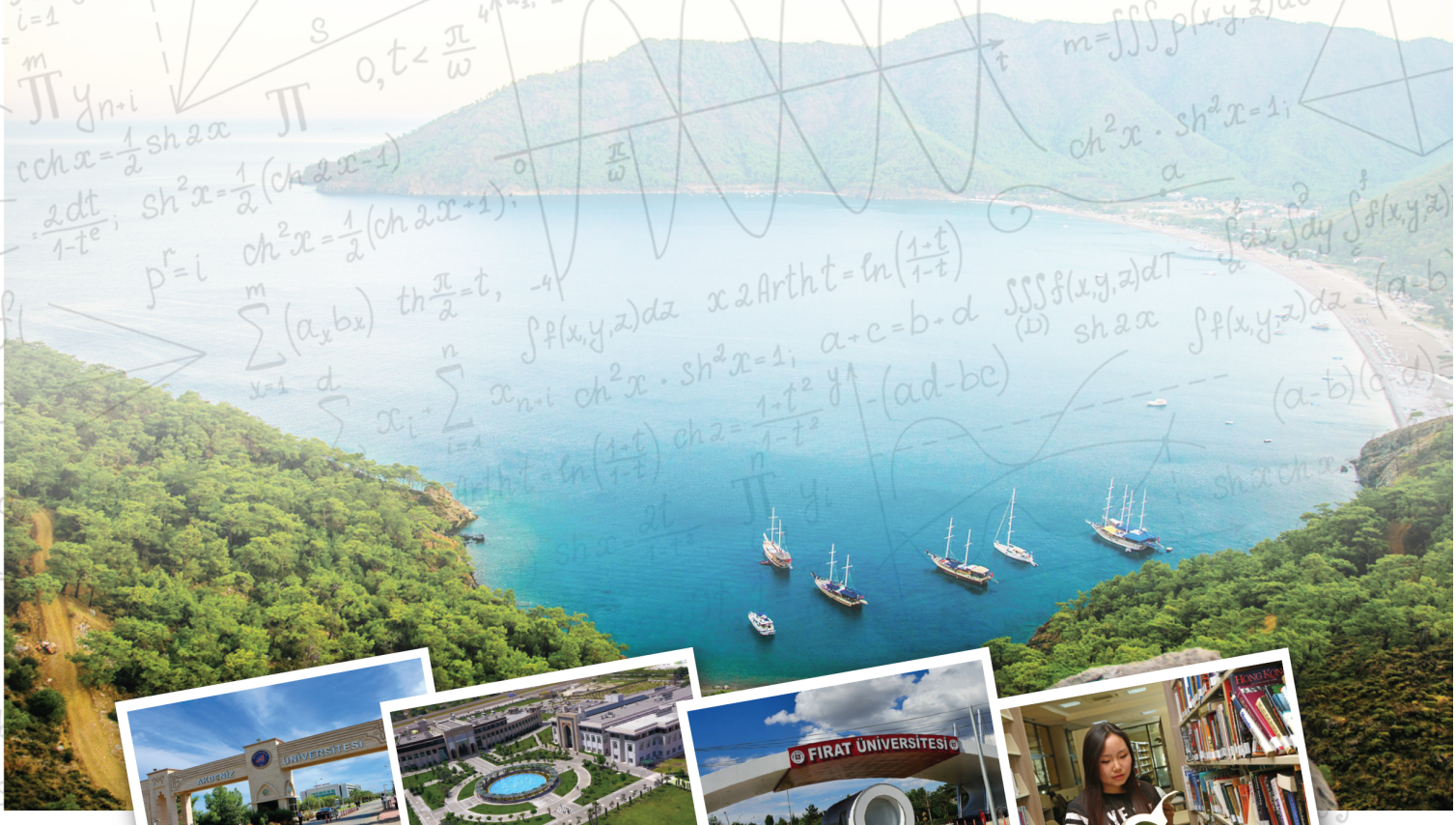

4th INTERNATIONAL CONFERENCE ON COMPUTATIONAL MATHEMATICS AND ENGINEERING SCIENCES - (CMES-2019)

20-22 April, Antalya, TURKEY

ABSTRACT BOOK

THE FOURTH INTERNATIONAL CONFERENCE ON COMPUTATIONAL MATHEMATICS AND ENGINEERING SCIENCES (CMES-2019), ANTALYA, 20-22 APRIL 2019

The Fourth International Conference on Computational Mathematics and Engineering Sciences (CMES-2019) will be held in Akdeniz University from April 20 to 22, 2019 in Antalya, Turkey. It provides an ideal academic platform for researchers and professionals to discuss recent developments in both theoretical, applied mathematics and engineering sciences. This event also aims to initiate interactions among researchers in the field of computational mathematics and their applications in science and engineering, to present reccent developments in these areas, and to share the computational experiences of our invited speakers and participants.

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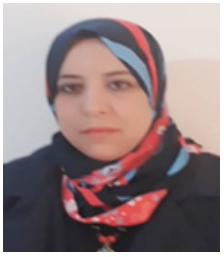


Dear Conference Attendees,

We would like to welcome you to the **4th International Conference on Computational Mathematics and Engineering Sciences (CMES-2019)** at Akdeniz Universityfrom April 20 to 22, 2019 in Antalya, Turkey. This year, the conference includes 300 extended abstracts, out of 300 submissions received in response to the call for papers, selected by the Program Committee. The program features keynote talks by distinguished speakers such asAbdon Atangana from Free State University, South Africa,Carlo Cattani from Tuscia University, Viterbo Italy, Jordan Hristov fromUniversity of Chemical Technology and Metallurgy, Bulgaria, Thabet Abdeljawad from Prince Sultan University, Saudi Arabia, Hayriye Gulbudak from University of Louisiana at Lafayette, USA, Francesco Villecco from University of Salerno, Italy, Mohammed Guedda from Picardie Jules Verne University Amiens, France, Vincenzo Ciancio from University of Messina, Italy, Necdet Bildik from Manisa Celal Bayar University, Manisa, Turkey, Etibar Penahli from Bakü State University, Bakü, Azerbaijan, Juan Luis García Guirao from Technical University of Cartagena, Spain. The conference also comprises contributed sessions, posters sessions and research highlights.

We would like to thank the Program Committee members and external reviewers for volunteering their time to review and discuss submitted abstracts. We would like to extend special thanks to the Honorary, Scientific and Organizing Committees for their efforts in making CMES-2019 a successful event. We would like to thank all the authors for presenting their research studies during our conference. We hope that you will find CMES-2019 interesting and intellectually stimulating, and that you will enjoy meeting and interacting with researchers around the world.

Hasan Bulut, Firat University Elazig, Turkey.
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Extended abstracts will be published in some Special Volumes of famous journals. Procedure, Guidelines and Checklist for the preparation and submission of a paper for the Proceedings of CMES-2019 can be found in the journals websites. The journals in which selected and peer-reviewed full papers of CMES-2019 will be published are follows:

1. Entropy (SCI-E with Charge) [Selected papers fitting with the scopes of the Issue will be published after peer review in the Topical Collection "Wavelets, Fractals and Information Theory" of the Journal Entropy (Impact Factor 2.305)]
https://www.mdpi.com/journal/entropy/special_issues/wavelets_fractals_inf_theory

2. Springer- Conference Proceedings Book:
Recent Advances in Computational and Engineering Mathematics.
Indexing: The books of this series are submitted to ISI Proceedings, EI-Compendex, DBLP, SCOPUS, Google Scholar and Springerlink [ISSN: 2194-5357]
https://www.springer.com/series/11156

3. Journal of Advanced Engineering and Computation:
"Selected papers will be published after peer review in the Journal of Advanced Engineering and Computation" :
http://jaec.vn/index.php/JAEC/pages/view/guidelines

4. Computational Mathematics and Modeling CMES2019
https://content.sciendo.com/view/journals/amns/amns-overview.xml

5. Journal of Sustainable Engineering Applications and Technological Developments
http://dergipark.gov.tr/smutgd

6. Mathematics in Natural Science (MNS)
(Editor in Cheif: Prof. Abdon ATANGANA)
http://www.isr-publications.com/mns

7. Mathematics in Engineering, Science and Aerospace (MESA),
(Editor in Chief : Prof. Seenith Sivasundaram)
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8. Conference Proceeding Book with
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PLENARY & INVITED SPEAKER TALKS

FRACTIONAL DIFFERENTIATION AND INTEGRATION ABOVE POWER LAW SOME NEW DEVELOPMENTS

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Abstract

To capture more complexities in nature some new differential and integral operators were suggested very recently. These differential operators are defined as fractal derivative of order beta of a convolution of power law, exponential decay and the generalized Mittag-Leffler function. I will represent some new theoretical results and their applications to capture nature.

Keywords: Generalized Mittag-Leffler function

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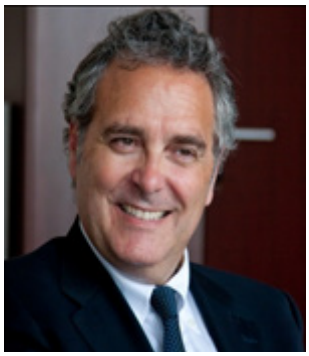

FRACTIONAL HARMONIC WAVELETS

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Abstract

In this talk a review on harmonic wavelets and their fractional generalization, within the local fractional calculus, will be discussed. The main properties of harmonic wavelets and fractional harmonic wavelets will be given, by taking into account of their characteristic features in the Fourier domain. It will be shown that the local fractional derivatives of fractional wavelets have a very simple expression thus opening new frontiers in the solution of fractional differential problems.

Keywords: Harmonic wavelets, local fractional derivative, wavelet series

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MULTI-SCALE STRUCTURED MODELS OF INFECTIOUS DISEASE DYNAMICS

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Abstract

Mathematical models can help describe the dynamics of complex biological systems. An important example, which spans several biological scales, is models of host-parasite interactions. In this talk, I will develop ODE-PDE hybrid structured models for infectious disease modeling [1,2]. In particular, I will introduce multi-scale vector-borne disease models, connecting dynamics at several interdependent scales: from cellular infection kinetics to population level epidemics. Applications to dengue and West Nile Virus (WNV), both of which have challenged both public health, suggest the need for the unified immunoepidemiological framework. These examples also showcase how analytical methods such as stability analysis, along with numerical simulation, can shed light on mathematical models in infectious disease research.

Keywords: Stability Analysis, Epidemiology, Equilibria, Structured PDE Models

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PERIODS OF CONTINUOUS MAPS ON SOME COMPACT SPACES

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Abstract

The objective of this talk is to provide information on the set of periodic points of a continuous self-map defined in the following compact spaces: S^n (the n-dimensional sphere), S^n×S^m (the product
space of the n-dimensionalwith them-dimensional spheres), CP^n (the n-dimensional complex projective space) andHP^n (the n-dimensional quaternion projective space). We use as main tool the action of the
map on the homology groups of these compact spaces.

Keywords: Discrete Dynamical Systems, Periods; periodic points; continuous map; Lefschetzfixed point theory; sphere; product of two spheres;complex projective space;quaternion projective space.

THIS TALK IS BASED ON THE PAPER:
Juan Luis García Guirao& Jaume Llibre (2017) Periods of continuousmaps on some compact spaces, Journal of Difference Equations and Applications, 23:1-2, 1-7, DOI: 10.1080/10236198.2017.1304932

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DIFFERENCE EQUATIONS AS THE BEST PAPER IN THIS FIELD OF 2017

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OPTIMAL PERTURBATION ITERATION TECHNIQUE FOR SOLVING BOUSSINESQ–BURGER EQUATIONS

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Abstract

In this work, we construct a new scheme for solving nonlinear partial differential equations using the theory of perturbation and optimization. We specifically analyze the semianalytical solutions of Boussinesq–Burger equations. The new obtained solutions reveal that this new process is very effecctive to solve these kinds of nonlinear partial differential equations.

Keywords: Perturbation techniques, optimization, Boussinesq–Burger equations

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ABOUT INVERSE PROBLEM ON TWO SPECTRUM FOR THE DIFFERENTIAL OPERATOR

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Abstract Let the sequences $\{\lambda_n\}_0^\infty$ and $\{\mu_n\}_0^\infty$ define the Sturm-Liouville problem

$$\left.\begin{aligned} &-y''+\{\lambda-q(x)\}y=0 \qquad (0\le x\le\pi),\\ &y'(0)-hy(0)=0,\quad y'(\pi)+Hy(\pi)=0,\end{aligned}\right\}$$

and, in addition, let the sequences $\{\tilde\lambda_n\}_0^\infty=\{\lambda_n\}_0^\infty$ and $\{\tilde\mu_n\}_0^\infty$, where $\tilde\mu_n=\mu_n$ for $n>N\ge 0$, define a second Sturm-Liouville problem

$$\left.\begin{aligned} &-y''+\{\lambda-\tilde q(x)\}y=0,\\ &y'(0)-\tilde hy(0)=0,\quad y'(\pi)+\tilde Hy(\pi)=0.\end{aligned}\right\}$$

In this speech, we show that the kernel $F(x,s)$ of the integral equation for the inverse problem, in which problem (II) is regarded as a perturbation of problem (I), has the form

$$F(x,s)=\sum_{n=0}^{N}\psi(x,\tilde\mu_n)\varphi(s,\tilde\mu_n)$$

in the triangle $0\le s\le x\le\pi$, wherein $\psi(x,\lambda)$ and $\varphi(s,\lambda)$ are solutions of (I).In particular, we obtain a new proof of Hochstadt's theorem concerning the structure of the difference $\tilde q(x)-q(x)$.

Keywords: Sturm-Liouville problem, Eigenfunction, Spectrum.

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ON CONTINUOUS AND DISCRETE FRACTIONAL OPERATORS WITH GENERALIZED MITTAG-LEFFLER KERNELS

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Abstract

At first a brief review about fractional operators with Mittag-Leffler kernels and their discrete versions will be given. The basic concepts will be cited and reffered to the right specific place they are firstly announced. Then, the continuous and discrete fractional operators of Riemann type (ABR) and Caputo type (ABC) with generalized Mittag-Leffler kernels will be presented, their corresponding fractional integrals or sums will be derived and their action on the continuous or discrete ABC-fractional derivatives will be demonestrated. In fact, as advantages of the obtained extension, we find thatwhen the second index is different from 1 we particularly obtain a nontrivial solution for the linear ABC type initial value problem with constant coefficient and prove a certain semigroup property in the second and third indices simultaneously.

Keywords: Generalized Mittag-Leffler kernel, ABC fractional derivative, ABR fractional derivative, AB fractional integral, semigroup property, discrete laplace transform, motonocity properties, discrete AB-fractional mean value theorem.

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SMART DEVICES FOR A BETTER LIFE

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Abstract

The agricultural revolution started in the Ancient Greece and still is under completion; the Industrial one required two centuries; the digital revolution has only a few years. Everything is now fast: a new technology appears every four months. A new device every four weeks.

The letters are now almost all "smart" as they more and more:
- observe and analyze the environment
- act after thinking
- analyze the effects of their actions
- learn from their mistakes.

The University of Salerno has opened since the 90's a School for Innovative Design, that uses either fuzzy logic and other methods for designing and developing new materials and apparatuses.

Among them we would like to point out:
MARS, a new method to monitor the patient's status for specific pathologies, and automatically activate save-life operations
RAPIDS, a drive simulator integrated with specially developed biomedical devices, that allows to define in
real time the neuro-psicho-physical conditions of a driver, as for instance a Lane-keeping-assistant (LKA);
an analyzer for cognitive load;
an on-line tester for drivers Blood Alcohol content.

SOME NEW SEQUENCE SPACES OF ORDER $\ALPHA$ DEFINED BY $\VARPHI$ FUNCTION

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Abstract

Let $\lambda=(\lambda_i)$ be a non-decreasing sequence of positive numbers tending to ∞ such that

$$\lambda_{i+1}\leq\lambda_i+1, \lambda_1=1.$$

In this paper we define the following sequence space of order α using the φ-function and de la Valee-Poussin mean. Let φ be given φ-function and f be given modulus function, respectively.

Moreover, let $A=(a_{nk}(i))$ be the generalized three parametric real matrix and $0<\alpha\leq 1$ be given. Then we define,

$$V_\lambda^0((A,\varphi),f)=\left\{x=(x_k):\lim_j\sum_{n\in I_j}f\left(\left|\sum_{k=1}^{\infty}a_{nk}(i)\varphi(|x_k|)\right|\right)=0, \textit{uniformly in } i\right\}.$$

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ON A CLASS OF SINGULAR INTERFACIAL EQUATIONS ARISING IN MOLECULAR BEAM EPITAXY

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Abstract

We re-examine a class of singular interfacial equations,
$\partial_t h + \partial_x \left[(\partial_x h)^{1-2\nu} + \partial_{xxx} h \right] = 0$
which is proposed for $\nu \geq 1$ to discuss the coarseningof growing interfaces, in the presence of a Ehrilch-Schwoebel-Villain barrier that induces a pyramidalor mound-type structure without slope selection. The above PDE issolved $\nu > \frac{1}{2}$, analytically in similarity form. The resulting similarity solutions are shown to have a periodic regime, for any indicating that the typical mound lateral size and the interfacial width growth with timelike $t^{(1+\nu)/4\nu}$ and $t^{1/4}$, respectively, without bound. This result coincides with the result previously presented by Golubovicfor and by Pimpinelli et al. Our contributionprovides a rigorous mathematical justification for the existence of special periodic similarity solutions to the singular interfacialequation and exhibits geometrical properties of the scaling functions. The present work provides support forsolutions with diverging $\partial_{xx} h$ at points where $\partial_x h = 0$ for $\nu \geq 1$.

Keywords: Front evolution, period identification, steady states, coarsening dynamics, nonlinear PDEs.

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CLASSIFICATION AND NEW FRACTIONAL OPERATORS

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Abstract

Fractional calculus is an emerging field in mathematics with a huge impact in a better description of the dynamics of complex systems. New fractional operators which were introduced during the last five years had a very important contribution in many fields of science and engineering. On the other hand there are, so far, five different classifications of the fractional operators. Some of them constructively criticized the old ones and some of them validated the new fractional operators.

In my talk I will discuss briefly the importance of the new operators and the contents of five classifications.

DERIVATIVES WITH EXPONENTIAL AND RELATED NON-SINGULAR MEMORIES: APPLICATIONS IN VISCOELASTICITY

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Abstract
The recently appeared fractional operators with non-singular memory kernel described by exponential (Caputo-Fabrizio derivative) and generalized Mittag-Leffler function (Atangana-Baleanu derivative) raise many questions about their properties and mainly about their physical relevance and applications.

This lecture focuses on the physics provoking creations of such fractional operators compare their properties with the features of the well-known fractional operators with singular kernels and mainly, try to clarify what really we may model with them. The response functions of the non-ageing viscoelastic materials are the main physical objects used to present the feasibility of the new derivatives in modelling viscoelastic constitutive equations.

Keywords: Linear viscoelasticity, non-power-law behavior, non-singular kernels. Constitutive equations, rheoleogical models

A DUAL-PHASE-LAG DIFFUSION MODEL FOR POPULATION GROWTH

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Abstract

Reaction-diffusion models were used in dynamic fluid, population growth, pulse propagation in nerves and other biological phenomena. Some of these models have been expanded to describe memory effects in diffusion and therefore with the use of hyperbolic equations deriving from the generalization of the Fourier and Fick laws. These generalizations come from the theory of extended irreversible thermodynamics (EIT) which is based on kinetic theory arguments. Recently it has been shown that, using the procedures of the classical irreversible thermodynamics with internal variables (CIT-IV), we can obtain equations for the dissipative flows that generalize the laws of Fourier-Fick and Cattaneo-Vernotte. In this paper, using the methodology of CIT-IV, we propose a new model that includes the effect of memory in the diffusion highlighting the presence of two relaxation times. The diffusion flow obtained is characterized by the sum of a parabolic and a hyperbolic contribution which allows the formulation of a dynamic system. We are characterized by traveling waves solutions with different generating particle source functions such as: a) logistic growth, b) generic cubic polynomial, c) strong Allee effect and d) weak Allee effect.

Keywords: Fourier's and Fick's law, Cattaneo-Vernotte equation, dual-phase lag, travelling waves, non-equilibrium termodynamics, internal variables, nonlinear diffusion.

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(k,m)-type partially null and pseudo null slant helices in Minkowski 4-space

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Abstract

In this study we define the notion of (k,m)-type slant helices in Minkowski 4-space and express some characterizations for partially and pseudo null curves in E^4_1.

Keywords: Minkowski space (k,m)-type slant helices partially null curve pseudo null curve.

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A comparison of a gradient based method and the differential evolution for shape identification problem

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Abstract

The purpose of this work is to develop two different method for solving a shape optimization problem derived from a free interface problem in a region of two domains. The first approach is a gradient based method, with a dynamic step size. The adjoint state is established to help with the computation of the shape gradient. The second method is the differential evolution algorithm it is a non gradient based method. The both methods are combined with a finite element solverSeveral numerical examples are established to prove the validity of the two approaches. A comparison of the obtained results is realized to show the robust approach.

Keywords: Conjugate gradient method, Differential evolution, Finite element method, Free boundary problem, shape optimization.

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A COMPUTATIONAL APPROACH FOR SOLVING FRACTIONAL DELAY DIFFERENTIAL EQUATIONS

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Abstract

Recently, fractional calculus has advanced in both theory and applications. Also, its applications in many different branches of science and engineering lead the improvement of the field. In this study, a numerical method has been introduced for solving fractional differential equations with delaysunder the mixed conditions. The method is based on generalized Laguerre polynomials and its matrix forms through collocation points. The efficiency of the method has been investigated by the comparison of different techniques in literature.

Keywords: Fractional delay equations, generalized Laguerre polynomials, Collocation method.

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A DATA MINING CLASSIFIER FOR PREDICTING EMPLOYEES' PSYCHOLOGICAL CAPITAL

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Abstract

A predictive model is developed in this research for employees' psychological capital classification. Multicollinearity was detected among the 20 predictors in the experimental dataset, therefore two regression types: logistic and ridge, were constructed to determine which of them effectively overcomes the multicollinearity challenge. The ridge model proved to be the most appropriate approach. The classifier can accurately classify an individual's psychological capital into the high or low class, with accuracy of 95%. The developed model sets the pace for full implementation of the Psychological Capital Questionnaire as a software application package for human resource management with respect to employees' psychological capital measurement. The study revealed the descending order of importance of the four components of psychological capital as: optimism, resilience, efficacy, and hope.

Keywords: Psychological capital; Data mining; Classification; Human resources; Ridge regression; Multicollinearity; Predictive accuracy.

A Descent Modified Three-term Conjugate Gradient Projection Algorithm and Its global convergence with applications to signal recovery*

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Abstract

In this article, we propose a three-term conjugate gradient projection algorithm for solving constrained monotone nonlinear equations. The global convergence of the algorithm was established under suitable assumptions. Numerical examples presented indicate that the algorithm has a very good performance in solving monotone nonlinear equations. Finally, the algorithm is applied to solve signal recovery problems.

Keywords: Non-linear equations, Conjugate gradient method, Projection method, Convex constraints.

Mathematics Subject Classification: 65K05, 90C52, 90C56, 52A20.

1. Introduction

Let C be a nonempty, closed and convex subset of the n-dimensional Euclidean space R^n, $F : R^n \to R^n$ a continuous and monotone function. In this article, we consider a convex constrained equation of the form

$$F(\bar{x}) = 0, \quad \text{subject to} \quad \bar{x} \in C. \tag{1}$$

Convex constrained equations have been used in many applied scientific fields, such as the economic equilibrium problems [5], the chemical equilibrium systems [10] and compressive sensing [19].

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THE DIGITAL TWIN AND TRACEABILITY IMPLEMENTATION IN AUTOMOTIVE INDUSTRY

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Abstract

In nowadays modern manufacturing approach the cyber physical systems plays a very important role in implementation of Industry 4.0 best practices. In order to maintain the cyber physical system for product life cycle management a comprehensive digital representation of each physical manufactured item is crucial. The paper presents a digital ecosystem for digital twin and traceability implementation in automotive industry. This ecosystem model consist of software and hardware implementations for multimodal data acquisition from welding robots, high speed forming press, laser printers, PLC's and similar industrial internet of things. A client server software architecture with edge computing in the production fields and high speed processing servers for machine learning and expert system support for tracking and evaluating the digital twin information with traceability data. Since quality control, evaluation, quantification and analysis of the collected data also plays an important role on the value of the data, the paper also represents a supervised learning approach with the gathered data for quality control within all steps of manufacturing process where available.

Keywords: Industry 4.0, Digital Twin, Traceability, Automative Industry, Digital Ecosystem, Big Data, Industrial IoT, Cyber-Physical Systems

A General Matrix Application of Non-increasing Sequences to Fourier Series

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Abstract : By using a non-negative and non-increasing sequence Bor [H.Bor, On the localization of factored Fourier series, Acta Unv. Appl. (2010) 239-245] has obtained a general theorem dealing with the local property of $\left|\overline{N}, p_n, \theta_n\right|_k$ summability of factored Fourier series. The purpose of this paper is to extend this result to more general matrix method.

Keywords: Summability factors, infinite series, Fourier series, local property

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A Handy Technique for Fundamental Unit in Specific Type of Real Quadratic Fields

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Abstract

Different types of number theories such as elementary number theory, algebraic number theory and computational number theory, algebra, cryptology, security and also other scientific fields like artificial intelligence using applications of quadratic fields. Quadratic fields can seperable in two parts as imaginary quadratic fields and real quadratic fields. To work or determine the structure of real quadratic fields is more difficult than imaginary one.

Keywords: Quadratic Fields, Continued Fraction Expansion, Fundamental Unit, Yokoi's invariants, Special Integer Sequences.

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A Mathematical Model of Colorectal Cancer with a Study of Early Detection

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Abstract In this paper, we present a mathematical model of colorectal cancer with piecewise constan arguments. The model includes the tumor population, the concentration of NK cells, the concentration of cytotoxic T-lymphocytes and the concentration of lymphocytes to explain the growth and interaction of the cells. To analyse the local stability, we used the Schur-Cohn Criteria, while for the global stability we considered a suitable Lyapunov function. Moreover, we consider the interaction of the population for an early detection of the colorectal cancer population by applying the Allee function at time t. The medical data are presented in the example part to support our theoretical studies.

Keywords: Colorectal Cancer; Differential Equation with Piecewise Constant Arguments; Stability Analysis; Allee effect

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A MODIFIED PARTICLE SWARM OPTIMIZATION WITH NONMONOTONE POPULATION

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Abstract

Particle Swarm Optimization (PSO) is a stochastic population-based algorithm, inspired by the behavior of social creatures, which interact between them in order to achieve a common goal. PSO is a powerful and promising optimization method, but it suffers from a major drawback of a possible premature convergence. To address this issue, we present a new modified particle swarm optimization. In this algorithm: Under specific condition, the function values are allowed to increase at certain iterations. Which gives rise to a "non monotone" population. The numerical results of solving benchmark problems indicate the performance of our proposed algorithm.

Keywords: Metaheuristic; Particle Swarm Optimization; Diversification.

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A Modified Proximal Point Algorithm

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Abstract

Monotone operator theory holds an important place in nonlinear analysis. It plays a crucial role in convex analysis, optimization, variational inequalities, semigroup theory and evolution equations. Many nonlinear operator equations are of the form $0 \in A(x)$, where A is a monotone operator in a Hilbert space H. A zero of a maximal monotone operator is a solution of variational inequality associated to the monotone operator also an equilibrium point of an evolution equation governed by the monotone operator as well as a solution of a minimization problem for a convex function when the monotone operator is a subdiffeerential of the convex function. Therefore, existence and approximation of a zero of a maximal monotone operator is the centre of consideration of many recent researchers. The most popular method for approximation of a zero of a maximal monotone operator is the proximal point algorithm popularly known as PPA. Its origin goes back to Martinet [1], Rockafellar [2], and Brezis and Lions [3]. Owing to the usefulness of PPA, Bacak [22] introduced the proximal point algorithm in CAT(0) space in 2013. Bacak generalized Brezis and Lions [3] on the proximal point algorithm in Hilbert spaces to complete CAT(0) spaces.

In this talk, we discuss a new modified proximal point algorithm in the setting of CAT(0) spaces and establish some strong convergence results of the proposed algorithm. In process, several relevant results of the existing literature are generalized and improved.

Keywords: Convex minimization problem; resolvent identity; CAT(0) space; proximal point algorithm; nonexpansive mapping.

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A NEW APPROACH ON THE ENERGY OF A PARTICLE IN DYNAMICAL AND ELECTRODYNAMICAL FORCE FIELDS IN THE ORDINARY SPACE

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Abstract

In this study, we investigate the energy on the particle in the classical elemantary mechanics. As opposed to traditional pyhsical approach, we use completely geometrical argument to compute the energy on the particle in vector fields. Firstly, we determine the energy on the particle in different force fields belonging to dynamical and electrodynamical system by using primarily second law of the Newton. Then, we correlate on the energy of the particle in the resultant force field and its components with the energy on the same particle in traditional unit vector field of Frenet vectors. We also give a physical example and obtain such a simple differential equation system to see the beauty of our work by comparing physical and geometrical meaning of the energy on the particle in dynamical and electrodynamical system.

Keywords: Dynamics System, Force, Energy, Frenet Vector.

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A NEW APPROACH TO NORMAL BIMAGNETIC CURVES IN TERMS OF INEXTENSIBLE FLOWS IN SPACE

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Abstract

In this work, we study inextensible flows of normal bimagnetic particles in space. Therefore, we obtain new results for inextensible flows normal bimagnetic particles in space.

Keywords: Magnetic curve, Inextensible flows, Frenet frame.

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A New Feature Representation Method for Intrusion Detection System

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Abstract

It is an undeniable verity that sensitive information is now an important presence for all companies, organizations and institutions. Hence, protecting this information and applying the cyber-security is a critical act by providing an intelligent cyber models against the sophisticated threats. These threats can be rise by launching malicious activities through any web server over the network. Meanwhile, enhancing the cyber security by developing an intrusion detection system (IDS) based on the machine learning which is a crucial fact and can be considered as one of the most important cyber-defense tools upon the networks.

In this paper, we proposed a new feature representation method for intrusion detection system, as well as providing a reliable data set that contains the most popular attacks that may happen in any network web server. We also discuss the challenges and the difficulties faced with the textual data source that suffers from the complicated feature representation methods. To address these challenges, we develop a Doc2Vec model which is an end-to-end deep learning method to identify useful patterns in order to learn a nonlinear document embedding for detecting attacks directly from the proposed data set. Moreover, we apply our model on the query strings obtained from the HTTP GET requests extracted from our faculty web server log file. This methodology learns document embedding in a mutually optimized framework to capture several types of semantic information. Furthermore, we extract the features vectors of these requests from a D matrix that is dimensional vector representation for each document along with a dictionary that contains 753 unique words found in the training corpus of the dataset. After applying our methodology, we obtained the whole data set which includes 23486 requests represented in three classes including the most popular attacks that may occur in any web server.

Keywords: Cyber security; IDS; HTTP; Web Server; GET Request, Log File; Dataset; Feature Representation; Semantic Information.

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A NEW GENERALIZATION OF POCHHAMMER SYMBOL AND ITS APPLICATIONS

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Abstract

In this study, we introduce a new generalization of the Pochhammer symbol by means of the generalization of extended gamma function [3]. Using the generalization of Pochhammer symbol, we give a generalization of the extended hypergeometric functions one or two variables. Also, we obtain various integral representations, derivative formulas and certain properties.

Keywords: Gamma function, Beta function, Pochhammer symbol, extended Pochammer symbol, Gauss hypergeometric function, confluent hypergeometric function, Appell hypergeometric function, extended Gauss hypergeometric function, extended confluent hypergeometric function, extended Appell hypergeometric functions.

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A New Numerical Solution for Singularly Perturbed Boundary Value Problems

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Abstract

In this study, a new numerical approach based on reproducing kernel method is applied for singularly perturbed boundary value problems. This method consist of obtaining an orthonormal basis function on specific Hilbert spaces. The approximate solution are obtained as serial form. Some problems are solved with presented method. Numerical outcomes indicate that the presented method is effective and convenient for singularly perturbed boundary value problems.

Keywords: Singular perturbation, Reproducing kernel method, Boundary layer

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A New Perspective For Soft Topological Groups

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Abstract

Theories of fuzzy sets, rough sets and soft sets are mathematical approaches for dealing with uncertainties. Soft set theory, initiated by Molodtsov in 1999, is highly utilized by economics, computer science, engineering and environmental science. This study is devoted to the definition of soft topological crossed module over soft topological groups. Examples are given to strengthen this definition, and the category of soft topological crossed modules is introduced. Finally, the relationship between soft topological crossed module and topological crossed module is discussed.

Keywords: Topological crossed module, soft topological groups, soft topological crossed module.

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A NEW VERSION OF DEVELOPABLE SURFACES WITH RIBBON FRAME

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Abstract

In this paper, we study new ruled surfaces by Ribbon frame. Moreover, we give some characterizations for developable surfaces according to Ribbon frame.

Keywords: Developable surface, Euclidean 3-space, inextensible flows.

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A nonlocal PDE-based approach for document images binarization

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Abstract

Document image binarization is a necessary pretreatment step in a wide range of documents analysis. In practice, it is still an enormous challenge due to the permanent presence of several forms of document degradation. The aim of this paper is to present a new nonlocal binarization method for degraded document images. The well-posedness of the proposed PDE is first checked then our algorithm is tested on the DIBCO datasets. The proposed model offers superior performance for both printed and handwritten documents.

Keywords: Binarization; document image; nonlocal operators; parabolic PDE;

A NUMERICAL SCHEME FOR NONLINEAR SINGULARLY PERTURBED REACTION-DIFUSSION EQUATION

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Abstract

In this study we consider the singularly perturbed boundary value problems for nonlinear reaction-difussion equations. A new exponentially fitted Numerov scheme is constructed and analysed on uniform mesh. The fitting factor obtained from the theory of singular perturbations. Theoretical convergence was supported by numerical examples.

Keywords: singular perturbation ,non linear reaction-difussion, numerov method,

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A NUMERICAL STUDY ON SINGULARLY PERTURBED PROBLEMS WITH MULTIPARAMETERS

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Abstract

In this presentation, numerical behavior of singular perturbed ordinary differential equations that depend on positive small parameters is investigated. An efficient method that combines the well-known Finite Element Method (FEM) and an asymptotic approach so-called Successice Complementary Expansion Method (SCEM) is employed for numerical simulations of the multi-parameter problems.

Keywords: Asymptotic approximation, singular perturbation, finite element, SCEM.

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A Numerical Solution of System Characterizing Curves of Constant Breadth

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Abstract

Frenet-like differential equations are mainly used in kinematics and geometric optics. In this study, we first present integral characterizations of such equations. Then, by using finite difference methods, we obtain the set of solution of Frenet-like differential equation that characterize curves of constant breadth arising in geometric optics.

Keywords: Frenet-like Differential Equations, Curves of Constant Breadth, Finite Difference Method

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A proposed optimization model for intermodal transport in logistic corridors

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Abstract

In this paper we propose an optimization model for transportation flows in a logistic corridor. Our general aim is to study the feasibility of an optimal transport plan in a high complex intermodal network, based on a shortest path routing problem. The modelling can provide informations about the different factors and costs that represent the structure of such complex system. the principal objective of this paper is to optimize the different costs as well as time travel of the multiple coordinations in a transport network, our model includes new factors that are linked to the concept of logistic corridors . In a first approach we address the mathematical formulation of the objective function as well as all the possible constrains, and proceed for an exact approach at the first place then a metaheuristic resolution using genetic algorithms. Our proposed model integrates multimodal transportation, specifically road and waterway modes of transport combined, and take in consideration various constrains (type of modes, types of costs, time window...). In this paper we highlight the need for a real time system to manage logistic flows and to make an optimal transport plan, and propose a preliminary multiobjective optimization model.

Keywords: Logistic Corridors, Multimodal transport, Real time optimization, Genetic algorithme .

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A Reliable Approach to Solve The Hirota–Satsuma Coupled KdV Equation by Using Residual Power Series

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Abstract

In this work, the so-called residual power series technique has been applied to find an analytic solution for an important equation in optical fibers called Hirota–Satsuma coupled KdV equation with time a series solution. The comparison of analytical approximate solution results with solution obtained exactly and results, concluded that the present method is an important addition for analyzing a system of partial differential equations have a strongly nonlinear term. We also represented graphically and discussed the effect of initial condition parameters and reaction of time on the model.

Keywords: Time Hirota–Satsuma coupled KdV equation ; Residual Power Series Method.

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A Semantic Portal for Accessing Courses and Lecturers of Information Systems Engineering Department of Near East University

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Abstract

The vision of the Semantic Web to propel the hyperlinked information disseminated on the Internet has gotten an overwhelming amount of thought by the semantic web scholars. The essential believed according to the scholars is to transform the present and normal web pages that we use on day to day basis into a Computer process-able data.

Semantic Portals are important for accessing information. For instance, newspapers websites, educational portals, publications portals all provide an access point to vast amount of information. However, as the size of knowledge in a portal increases, search and access to information becomes challenging. As a solution, Semantic Web technologies can be utilized; knowledge can be represented with machine process-able metadata using ontologies, which enables reasoning and complex querying of the knowledge. This is the main focus of this paper. We have developed a semantic portal for Information Systems Engineering Website of Near East University. First, we have developed a University Ontology using Web Ontology Language (OWL). Then, information about the courses and lecturers are annotated according to this ontology and saved to a database called University Ontology. The University Ontology controls the information and the structure of the semantic portal.

Finally, a user interface was developed in order to access information using complex SPARQL queries. User text queries about courses, lecturers etc. are automatically converted to SPARQL queries and searched across the University Ontology. Then results are presented using the detailed metadata based on the University Ontology. We have performed extensive user evaluations in order to assess the usability of the semantic portal against the actual website of the Information Systems Engineering. We compared user satisfaction using post-questionnaires, as well as, measured task completion times, number of page views and user scores. Results show that the developed semantic portal enabled users to access information in a more efficient way.

Keywords: Semantic web, search, ontology, web interface, semantic portal.

A SEMI-ANALYTICAL SOLUTION OF THE CONTACT PROBLEM WITH MIXED BOUNDARY CONDITIONS FOR THE INHOMOGENEOUS LAYERS LOADED BY A FLAT PUNCH

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Abstract

A semi-analytical solution in contact problems of the elasticity theory for inhomogeneous layer of thickness H is developed. Nonhomogeneous property of the layer is represented in terms of an exponential variation of the shear modulus with depth, while Poisson's ratio is taken to be constant. The lower boundary of the layer is hinged to a rigid foundation. A rigid flat punch width $2a$ is pushed by a tangential force P on the top surface of the layer and moves at a distance ε. Outside of the punch, upper surface is traction-free.

The technique based on the Fourier integral transforms is used to reduce the problem to integral equation for the unknown contact pressure. Numerical results are provided to demonstrate how the distributions of the contact and in-plane component of the surface stress are affected by various material geometric parameters of the layer.

Keywords: Elasticity theory, singular integral equations, contact problems.

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A Special Class of Fuzzy Matrices and Its Prioritization

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Abstract

The present work introduced a special class of fuzzy comparison matrices and a novel method to derive priorities of its members. Assessment of the fuzzy priorities of its members depends upon the transformation of fuzzy comparison matrices into the crisp comparison matrices. The efficiency of proposed method is discussed in details and illustrated with the help of solved examples. Also, it is concluded that the proposed method of priorities derivation is easiest and faster than the other existing methods.

Keywords: Fuzzy matrices, Fuzzy analytic hierarchy process, Triangular fuzzy numbers, Fuzzy
priorities.

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A STUDY ON NULL CARTAN CURVE IN MINKOWSKI 3-SPACE

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Abstract

Due to its many application from geometry to the different branch of science, curve theory has been one of the most studied subjects. In special curve types such as so - called helices, the curvature and torsion play an important role.

In differential geometry, a general helix or a curve of constant slope in Euclidean 3-space E^3 is defined in such a way that the tangent makes a constant angle with a fixed direction. A classical result stated by M. A Lancret in 1802 and first demonstrated by B. de Saint Venant in 1845.

In this paper, we study special curves such as helices and AW(k)-type curves using Bishop frame. Firstly, we define AW(k)-type null cartan curve in Minkowski 3-space, then we give helices according to Bishop frame of null cartan curve in Minkowski 3-space.

Keywords: Null cartan curve, AW(k)-type curve, helix.

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A UNIQUENESS THEOREM FOR SINGULAR STURM-LIOUVILLE OPERATOR

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Abstract

In this article, we study the wellposedness of the inverse problem for Sturm-Liouville equation with coulomb potential. We will consider two different inverse problem for Sturm-Liouville equation with coulomb potential. We will prove that ıf the spectral characteristics of this problems are close to each other, then the difference between their potential functions is sufficiently small.

Keywords: Coulomb Potential function, wellposedness, Sturm-Liouville operators

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A uniformly convergent second order difference scheme for parameterized singularly perturbed problem with integral boundary condition

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Abstract. In this paper, we propose homogeneous type fitted difference scheme for solving parameterized singularly perturbed differential problem with integral boundary condition. We prove that the method is $O(N^{-2} \ln N)$ uniform convergent on Shishkin meshes. Numerical results are also presented.

2010 Mathematics Subject Classification: 65L11, 65L12, 65L20, 34K26.

Keywords: Parameterized problem; Singular perturbation; Uniform convergence; Finite difference scheme; Shiskin mesh; Integral boundary condition

An Accurate Technique for Solution of Fractional Differential Equations

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Abstract

The goal of this paper is to give an accurate technique based on reproducing kernel functions for numerical solutions of fractional differential equations. Some examples are presented to prove the power of the technique. A bounded linear operator has been used to get approximate solutions of the problems. Some special Hilbert spaces are constructed and reproducing kernel functions have been found in these spaces.

Keywords: Reproducing kernel method; Series solutions; Fractional differential equations.

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AN ANALYTICAL APPROACH FOR TIME FRACTIONAL BAD AND GOOD BOUSSINESQ EQUATION

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Abstract

In this article, we employ the auxiliary equation method for finding exact solutions of the Bad and Good Boussinesq equations that can be considered as a model of shallow water waves. By using the conformable wave transform and chain rule nonlinear fractional partial differential equation are converted into nonlinear ordinary differential equations. This is an important impact because both Caputo definition and Riemann-Liouville definition don't satisfy the chain rule. By using conformable fractional derivatives, reliable solutions can be achieved for conformable fractional partial differential equations.

Keywords: Bad and Good Boussinesq Equation, Conformable Fractional Derivative, Auxiliary Equation Method, Conformable Wave Transform, Chain Rule.

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An application of absolute matrix summability to trigonometric Fourier series

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Abstract: In this paper, a known result dealing with $|\overline{N}, p_n, \theta_n|_k$ summability factors of quasi-β-power of increasing sequence have been generalized to $|A, \theta_n|_k$ summability method by using normal matrix. Also we obtain an application of it to the trigonometric Fourier series.

Keywords: Summability factors, infinite series, Fourier series, Hölder's inequality, Minkowski inequality.

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An Application of New Method to Obtain Probability Density Function of Solution of Stochastic Differential Equations

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Abstract

We have developed a new method to evaluate approximate probability density function of random variable of solution of stochastic differential equations (SDE) by using Generalized Entropy Optimization Methods (GEOM). The probability density function according to random variable which is solution of SDE at a fixed time is the solution of Fokker-Planck-Kolmogorov (FPK) equation at this time. By starting given statistical data and Euler-Maruyama approximating SDE method are constructed several trajectories of SDE. The constructed trajectories allow to obtain random variable according to fixed times. Probability density function of each of mentioned random variables is obtained by GEOM. In this study, we illustrated the use of described new method to applicate SDE model fitting on weekly closing prices of Honda Motor Company stock which is traded in New York Stock Exchange (NYSE), between the dates of 02.07.2018-25.03.2019 and corresponding approximate solution of FPK equation.

Keywords: Generalized Entropy Optimization Methods, Fokker-Planck-Kolmogorov Equation, Stochastic Differential Equation Model, Euler-Maruyama Method

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AN APPROACH ON THE ASYMPTOTIC BEHAVIORS OF NON-LINEAR NEUTRAL SYSTEMS WITH TIME-VARYING LAGS

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Abstract

In this paper, we presented some sufficient conditions for the asymptotic behaviors of non-linear neutral systems with time-varying lags. The approaches to achieving these sufficient conditions are based on the Lyapunov–Krasovskii stability theory for functional differential equations and the matrix inequality technique. Consequently explicit criteria are derived for asymptotic analysis of solutions of the system considered. Two numerical examples are given to show the effectiveness and applicability of proposed method by MATLAB-Simulink. The results obtained extend and improve some found in the literature.

Keywords: Neutral system, Lyapunov-Krasovskii functional, time-varying lag, asymptotic stability.

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An asymptotic result for neutral differential equation

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Abstract

In this study, we obtain asymptotic result for the solutions to second order neutral differential equations, by the use of the concept of generalized characteristic equation.

Keywords: Neutral differential equation, asymptotic behavior, generalized characteristic equation.

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AN EARLY DETECTION MODEL FOR A BRAIN TUMOR-IS INTERACTION WITH FUZZY INITIAL VALUES

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Abstract

In this paper, we consider a model which has a predator-prey structure between the monoclonal tumor and the macrophages. Building upon the work of F. Bozkurt [1], we include fuzzy initial values to study the interaction of a monoclonal brain tumor and the macrophages for an early detection treatment. From one hand and as a result of using fuzzy initial values, the uniqueness of the solution is lost. On the other hand, and using the strongly generalized derivative, a best solution which reflects the actual behaviour of the system can be chosen.

Keywords: Fuzzy number, Fuzzy derivative, Fuzzy differential equations (FDE), Fuzzy initial values

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AN EFFICIENT HIGH ORDER ALGORITHM FOR SOLVING REGULARIZED LONG WAVE EQUATION

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Abstract

The Regularized Long Wave (RLW) equation

$$u_t + u_x + \varepsilon u u_x - \mu u_{xxt} = 0$$

was formulated by Peregrine as an alternative to KdV equation for studying soliton phenomenon with boundary conditions $u \to 0$ as $x \to \pm\infty$ [1]. Since the RLW equation has been solved analytically only for restricted set of boundary and initial conditions [2], the numerical solution of the RLW equation has been the subject of many papers over the last few years. In this study, the RLW equation is solved numerically by Galerkin finite element method, based on cubic trigonometric B-spline for the space discretization and fourth order Runge Kutta method for time discretization. The numerical example related to single solitary wave is considered as the test problem. To see the accuracy and efficiency of the proposed method, the error norm L_∞ is computed and the three conservation quantities of the motion are calculated to determine the conservation properties of the proposed algorithm. The obtained results show that proposed algorithm exhibit high accuracy and efficiency in both conservation of the invariants and error norm for the numerical solution of the RLW equation.

Keywords: Galerkin finite element method, Cubic trigonometric B-spline, Regularized Long Wave (RLW) equation, Solitary waves

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An efficient technique for coupled fractional Whitham-Broer-Kaup equations describing the propagation of shallow water waves

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Abstract

In the present work, the approximated analytical solution for the time-fractional coupled Whitham-Broer-Kaup (WBK) equations describing the propagation of shallow water waves are obtained with the aid of an efficient computational technique called,q-Homotopy analysis transform method (briefly, q-HATM). To demonstrate the reliability and efficiency of the proposed technique, two examples are illustrated. The homotopy polynomials are hired in order to handle the nonlinear terms and the suggested algorithm provides the auxiliary parameters$\hbar$ and$n$, which help us to control and adjust the convergence region of the obtained series solution. Numerical simulation has been carried out in terms of absolute error. The obtained results revels that, the proposed algorithm is highly methodical and very efficient to solve coupled nonlinear differential system.

Keywords: q-homotopy analysis transforms method; fractional Whitham-Broer-Kaup equations; Laplace transform.

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AN ENERGY-SAVING MODEL IN FRAME OF THE LOCAL DERIVATIVE

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Abstract

In this study, an energy-saving based model is proposed by virtue of the newly defined local derivative containing truncated Mittag-Leffler function. In order to examine this model which has a crucial place in daily life, we present Laplace transform of underlying limit-based local derivative for α-differentiable functions. Accordingly, a new analytical solution including two parameters α, β such that $0 < \alpha \leq 1$ and $\beta > 0$ is displayed to better control of the non-renewable resources. One of the most remarkable feature making aforementioned model important is that it has two distinct non-integer parameters, which enable us to approach maximum energy efficient for buildings. Moreover, simulation analysis is carried out to observe the mobility of the solution curve in line with our objective.

Keywords: Energy efficiency, Local derivative, Truncated Mittag-Leffler function, Heating, Cooling.

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AN INVERSE SPECTRAL PROBLEM FOR INTEGRO DIFFERENTIAL OPERATORS WITH FROZEN ARGUMENT

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Abstract

We study integro differential operators possessing a term depending on the unknown function with a fixed argument and examine the uniqueness of recovering the operators from the spectrum. We also obtain a constructive procedure for solving this inverse problem.

Keywords: Frozen argument, Inverse spectral problem, integro differential operators

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ANALYSİS OF A NONLINEAR ALCOHOLISM MODEL VIA NEW FRACTIONAL OPERATOR

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Abstract

We analyze an alcoholism model via Caputo-Fabrizio fractional derivatives. Special solutions using an iterative scheme via Laplace and Sumudu transform were obtained. Numerical examples of the solutions are provided to show that the Adam-Basford method are computationally efficient.

Keywords: Alcoholism model, Laplace transform, Sumudu Transform, Caputo-Fabrizio fractional derivative.

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ANALYSIS OF STUDENT LEARNING IN DIFFERENTIAL EQUATIONS LEARNING AREA BASED ON VARIOUS VARIABLES

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Abstract : Development of mathematical models for problems experienced in areas of study is important for improvement in almost scientific field. The solution of a problem requires the development of a mathematical equation (or a mathematical model) based on the properties of the problem in certain disciplines. Such an equation is generally a function with one unknown and an equation that includes the derivatives (or differentials) of this function. The equation, which contains a function and its finite derivatives, is called a differential equation (Pisces 2018). The present study aimed to analyze the learning of college students in differential functions based on various variables. The study was conducted in two faculties of a public university (Engineering and Education Faculties) for a year during the differential equations course with 300 students using exams and conducted applications, and the achievements of the students were analyzed based on the problems experienced by the students, the conceptual comprehension and operational comprehension, reasoning skills, misconceptions, transition between representations, and basic mathematics knowledge variables. The present study is a descriptive study that utilized screening models. Since it was possible to reach the whole population in the study, the complete census method was used. The main difficulties that were experienced by the students were determined as follows: inability to conduct the operations or conducting incorrect operations due to the lack of basic mathematics knowledge, student focus on operational comprehension instead of conceptual comprehension, inability or indecision of the students in establishing the correlation between the algebraic and graphic representations of the differential equation in transfers between representations, misconception that dependent variable should always be identified by y and independent variable should always be identified by x (this could be due to a habit of teachers), and although $dx-2xydy-2ye^{y^2}dy$ can be easily solved by linearization, students' preference to attempting to find the integral multiplier, leading to operational errors. It can be argued that the achievements increase when the applications that would eliminate these difficulties are conducted in the following topics, however a comprehensive study should be initiated in order to eliminate the lack of basic mathematics knowledge and even, it would be beneficial to study on OSYM selection system.

Keywords: Differential equations, learning difficulties, OSYM selectivity, student achievements.

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Analysis of a new partial integro-differential equation with mixed fractional operators

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Abstract

We have introduced a new partial integro-differential equation with mixed fractional operators. The differential operator can be that of Caputo while the integral is consider to be Caputo-Fabrizio or the Atangana-Baleanu integral. We presented the well posedness of the new class of partial differential equation. We presented the conditions under which the existence and uniqueness are obtained. We presented under some conditions the derivation of exact solution. We suggested a numerical scheme that will be used to solve such mathematical equations. We presented some illustrative examples.

Keywords: *Fractional differentiation, fractional integration, new numerical schemes, new partial differential equation.*

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Analytical Estimating the Muscle Activities in 3D Musculoskeletal Model of Human Arm, Using Kane Formulation

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Abstract

Due to indeterminate nature of musculoskeletal dynamics problems, massive volume of calculations incorporates some limitations in dynamic analysis of musculoskeletal systems [1, 2]. So, attempts should be made to find some better methods for both determining the equations of motion and solving them. In this paper a three-dimensional musculoskeletal model of human arm [3], has been utilized and inverse dynamic has been solved to estimate the activity of upper extremity musculotendon actuators during elbow flexion with dumbbell. Equations of motion have been derived from Kane formulation and an optimization process based on Genetic Algorithm has been used to solve the inverse dynamic problem. Specific characteristics of Kane formulation, such as a less number of dependent variables, make it more proficient than Newton-Euler approach. In addition, Kane formulation is more systematic and straightforward than some other common approaches like Lagrange method. Despite the fact that the difference between the number of nonlinear constraints and unknowns in Kane method and Newton-Euler methods is the same, analyzing a problem with fewer variables has always a better performance. Additionally, due to the complication of constraint equations, utilizing GA could be an efficient method for solving the inverse dynamic of the problem.

Keywords: Inverse Dynamic; Kane Formulation; Musculoskeletal Model; Optimization.

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ANALYZING THE CLASSIC CAESAR METHOD CRYPTOGRAPHY

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Abstract

The Caesar Encryption method is about creating an encrypted message by shifting each letter of the plain text forward by the specified number of keys. In order to decode the cipher, each character in the encrypted message with the number of keys goes back to the number of keys and convert it to plain text. Even though this method is very old and not being a robust encryption method, forms the basis of cryptography. The paper introduces this method by explaining the use cases of it and presents experiments related to its encryption power.

Keywords: Cryptography, Caesar Cipher, Encryption, Decryption, Cipher Text, Plain Text

1 Introduction

Privacy has been the most important criterion in communication since human beings have developed new methods to communicate and since the necessity of storing their messages from other people has emerged [1]. Encoding the information emerged thousands of years ago, and the empires of the secret and important information can be transmitted to the enemy's hands have emerged. Although the message is sent by hand or by a slave, it is likely to always be in the hands of others, even if sent by mailers or via the Internet [2]. For this reason, encoding the message, in other words, sending a word or sentence by changing it by another word, number or symbol makes it difficult for others to understand the message [3]. The messaging parties can come together and agree on the codes they will use before they can communicate[4]. The general problem of communication and information is information security. In particular, in recent years, increasing the number of online shopping, e-mail traffic and the Internet have forced the Internet to become a safer environment. Therefore, we focus on how to achieve a high level of information and communication security. This is the Cryptology science. As a result, the change of communication today is the importance of Cryptography which has become an interdisciplinary science. Cryptography, a branch of Cryptology, is derived from the words "**kryptos"** meaning secret in Greek and "**graphein**", which means writing [5]. Cryptography is a set of techniques that can be used to transform readable information into an unreadable format for undesired parties [6]. With the shifting key specified by the sender and the recipient, the original text is converted to the text, so that the recipient can obtain the original text with the shifting key.

Anodization of TiO_2 Nanotubes as Biomedical Materials

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Abstract

TiO_2 nanotubes fabricated through anodization of Ti foils in (NH4F 0.5 wt%) & (ethylene glycol 95.5wt%) with (4wt % di ionized water).The effect of voltage variation on the tube diameter, tube length, tube wall thickness and cell diameter for (1) hr, in room temperature was investigated. The anodization potential was varied from (10, 20, 30, 40, 50, 60, 70 and 80) V with fixed parameters like concentration NH4F, time and temperature was achieved in the preparation of nanotubes. Optimum morphologies were observed for nanotubes prepared in (50 and 80)V. At 50V, the length and diameter of tubes approximate 3019nm& 79nm respectively, while at 80V the length and diameter of tubes approximate 8210nm & 46nm respectively, the oxide layer morphology was achieved using FESEM microscope.

Keywords: Anodization, TiO_2 nanotubes, Biomedical

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APPLICATION OF THE KORTEWEG-DE VRIES-BURGERS EQUATION WİTH ATANGANA-BALEANU FRACTIONAL DERIVATIVE WITH NON-SINGULAR KERNEL

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Abstract

In this work, we examine the Korteweg–de Vries–Burgers equation with two perturbation's levels to the concepts of fractional differentiation with no singularity. Using the Atangana-Baleanu fractional derivative with no singular kernel, we prove the existence and uniqueness solution. We also solved the Korteweg–de Vries–Burgers equation numerically for some values of the perturbation parameters. By using the critical results obtained for the models, the graphics are then compared with the rest.

Keywords: The Korteweg-De Vries-Burgers Equation (KDVB), Atangana-Baleanu fractional derivative.

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APPLICATION OF THE MODIFIED EXPONENTIAL FUNCTION METHOD TO VAKHNENKO-PARKES EQUATION

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Abstract

In this paper, we submit some new travelling wave solutions for the Vakhnenko–Parkes equation via the modified exponential function method. The obtained solutions include hyperbolic, exponential, trigonometric function solutions. Regarding these solutions, the 2D and 3D graphs and contour simulations are presented.

Keywords: The nonlinear evolution equations; the Vakhnenko–Parkes equation; the modified exponential function method

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Application of $\left(\frac{G'}{G}\right)$-Expansion Method to Wu-Zhang Equation and Modified Bossinesq Equation

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Abstract

In this paper, $\left(\frac{G'}{G}\right)$-expansion method is used to investigate solutions of Wu-Zhang equation, Modified Boussinesq equation. The equations are reduced into one nonlinear partial differential equation (NLPDE) via Miura transformation and the hyperbolic function and trigonometric function solutions of NLPDE are obtained.

Keywords: Wu-Zhang equation, Modified Boussinesq Equation, $\left(\frac{G'}{G}\right)$-Expansion Method, Miura transformation, soliton solutions.

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Application of Hopf-Cole Transformation in Some Partial Differantial Equations

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Abstract

In this paper, a nonlinear partial differential equation system is considered and Hopf-Cole transformation is used to linearize it. Using this method, we solve the initial value problem and initial boundary value problems for some parabolic partial differential equations systems. In addition, the moving wave solutions of these partial differential equations, which are a significant source of physical interest, were obtained.

Keywords: Hopf-Cole transformation, initial value problem, wave solutions, parabolic.

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ATTRACTORS FOR THE PETROVSKY EQUATION WITH DAMPING TERM

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Abstract

In this paper, we investigate the Petrovsky equation with weak damping term. We prove the existence of the global attractors in some Sobolev spaces.

Keywords: Attractors, Petrovsky equation, Damping term

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BASIC FIELD DEPENDENCES OF MAGNETIC INDUCTION IN THE SHORT GRANULATED SAMPLES AND THEIR ANALYSIS

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Abstract

Experimental field dependences of induction are given in the cylindrical granulated samples (filling of ball-bearing spheres) with various relations of length of L to diameter of D. From positions of physical ideas of interrelations of magnetic parameters of "long" and "short" magnetics the corresponding field dependences of magnetic permeability, susceptibility, magnetization received on their basis are analyzed. It is shown that dependences of magnetic parameters on a relative dimension of L/D become automodel at L/D values ≥ 10-12 (much more smaller than for continuous magnetics) when the sample can be considered rather "long", i.e. it in which the values of magnetic parameters inherent in "material" (quasicontinuous) of these samples are reached. In addition to this feature of the granulated magnetics one more characteristic is noted - it is absence (unlike continuous magnetics) signs of magnetic saturation of such (quasicontinuous) magnetics, even in the field of rather increased and high tension.

The possibilities of use of the received earlier phenomenological expression for the degaussing factor of type decreasing exhibitors are considered. Except that option when in an indicator exhibitors parameter constant (as averaging) is multiplied by a radical of a relative dimension of a sample, also other options are considered. In particular, it is option of multiplication of the variable parameter (depending on tension of the field, so from magnetic permeability and susceptibility of a quasicontinuous sample), on exponential, but different from the radical, function of a relative dimension of a sample.

Keywords: The granulated sample, magnetic induction, permeability, susceptibility, magnetization degaussing factor

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Best Coapproximation in Tensor Product Spaces

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Abstract

In this paper we study the problem of best coapproximation which was introduced by Frunchetti and Furi (1972) in the case of tensor product of two Banach spaces induced by the projective and injective norms. Moreover some results on the quotient space of some Banach spaces included tensor product are obtained.

Keywords: Banach space, tensor product, injective and projective norms, quotient space

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Breast cancer modeling for women of Tafilalet area, South-east of Morocco

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Abstract

Breast cancer is the first cancer diagnosed for women in the world. It is the principal cause of death among women with a number of deaths of 521,000 cases in 2012 (WHO).

Early diagnosis is very important in reducing the incidence of cancer. In Morocco, the National Plan for Prevention and Cancer Control, piloted by the foundation Lalla Salma, included among its strategic prioritie early detection of breast cancer.

Objective: To create an epidemiological model of breast cancer in women in the Tafilalet region in the south-eastern of Morocco.

Method: Data were collected from registers of the centre of reference and early detection of breast and cervical cancer Errachidia, seizure was centralized in a single database. Results were expressed as percentages for categorical variables and as means ± standard deviation for quantitative variables (age). We used the chi-square test to study the correlations between the different qualitative parameters. Difference was considered significant when $p < 0.05$, very significant at $p < 0.01$ highly significant at $p < 0.001$.

Results and conclusions: The main results of this study were:

-The Breast cancer confirmed rate was 4.2% (n = 100)

-The third (1/3) of women with breast cancer were younger than 45 years.

-The frequency of occurrence of left breast cancer exceeds that of the right side (ratio = 1.36).

-Breast cancer monitoring does not take into account the proximity of the housing of the patients to the diagnostic centre $p < 0.005$.

-The incidence of breast cancer significantly increases with the age of patients ($p < 0.001$).

Keywords: Breast cancer, Modeling, Epidemiology, Morocco

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-Master thesis "Nutritional study among women consultants of the cancer diagnosis center in the region of Tafilalet" 2015, 71p.

Characteristic Sets verses Generalized Characteristic Sets for Ordinary Differential Polynomial Sets

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Abstract

The concept of characteristic sets developed initially by Ritt and Wu has turned into a standard tool for the study of set or systems of polynomial and algebraic differential equations. With the help of constructing characteristic sets, an arbitrary set or system of polynomials or differential polynomials can be triangularized. It means that it can be decomposed into particular set or system of triangular form. In this paper, a comparison of Ritt-Wu's characteristic sets by Wang for the ordinary differential polynomial sets, with the generalized characteristic sets of the ordinary differential polynomial sets by author, has been presented.

Keywords: Characteristic set; differential polynomial; pseudo division; admissible reduction

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Comparison of Solution Methods for Fully Fuzzy Linear Programming Problems

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Abstract

The interest in Fuzzy Linear Programming problems with fuzzy numbers has been increasing recently, and the Fully Fuzzy Linear Programming (FFLP) problems are getting a big attention in the last few years. Many types of fuzzy numbers are used in the literature to represent the fuzziness in FFLP problems. For instance, Ozkok et. Al [1] and Kumar and Kaur [2] used the triangular fuzzy number, while the trapezoidal fuzzy number was used by Das et. al [3] and Saati et. al [4]. One of the main shortcomings of these methods is that they do not keep the same solution when the FFLP is converted to Crisp (unfuzzy) Linear Programming (CLP) using the ranking function. Tuffaha and Alrefaei [5] have proposed a generalization of the two types of fuzzy numbers by the Piecewise Linear Fuzzy Number (PLFN), and they introduced a new ranking function with convenient arithmetic operations. Tuffaha [6] has also introduced a simplex-based solution method for FFLP problems with PLFN's that keeps the same solution when the FFLP is converted to CLP. In this paper, we implement this method for solving FFLP and compare the results with the results of other exising ones.

Keywords: Fuzzy Numbers, Piecewise Linear Fuzzy Numbers, Fully Fuzzy Linear Programming

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COMPLEX TRAVELLING WAVE SOLUTIONS TO NONLINEAR (2+1)-DIMENSIONAL CUBIC KLEIN-GORDON EQUATION BY (1/G') -EXPANSION METHOD

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Abstract

Examining the internal structure of complex physical events plays an important role in my nonlinear evolutionary equations. In this article, we have applied the method (1/G') to find solutions of nonlinear (2+1)-dimensional cubic Klein-Gordon equation. The solutions that provide the equation and the parameters are obtained. These solutions are of the new complex walking wave solutions. The graphs of the solutions representing the static wave were presented in 3 dimension by giving special valves to the parameters in the solution. It has been observed that this method is an important instrument for obtaining walking wave solutions of mathematical and physical equations. Complex operations and graphical drawings were made using special package programs.

Keywords : cubic Klein-Gordon Equation; Complex Travelling Wave Solutions;

(1/G') -expansion Method

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COMPUTATIONAL INVESTIGATION OF FULL-HEUSLER ALLOY FOR Ir_2ScAl ALLOY IN THE $L2_1$ PHASE

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Abstract

The first principle density functional calculations of the electronic band structure, the mechanical and structural stability of Ir_2ScAl alloy in the $L2_1$ phase are presented. The calculated ground states properties, such as the mesh constant and the bulk module, are in good agreement with the previous theoretical calculations. The numerical first-principles calculations of the elastic constants have been used to calculate C_{11}, C_{12}, and C_{44} for Ir_2ScAl. These calculated elastic constants satisfy the mechanical stability criterion and the ductility of Ir_2ScAl is predicted by Pugh's criterion. The electronic band structures and projected densities of states for Ir_2ScAl alloy have been computed and analyzed. The electronic band calculations showed that the Ir_2ScAl alloy has a metallic nature.

Keywords: mechanical properties, DFT,

CONTACT PROBLEM BETWEEN FUNCTIONALLY GRADED LAYER AND FUNCTIONALLY GRADED PUNCH USING FEM

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Abstract

Heterogeneous special microstructures whose mechanical properties vary regularly and continuously from one point to another are defined as functionally graded materials (FGM). FGM is preferred in contact problems especially in terms of preventing the damage that may occur in the contact zone. The problem of continuous contact in a functionally graded layer loaded with a functionally graded (FG) punch resting on the elastic semi-infinite plane is discussed in this study. Layer weight was included to the problem and additionally all surfaces were considered as frictionless. The finite element method was used for solution of the problem. Analysis of FG materials was performed with a special macro which was added to the ANSYS program. Firstly, the shear modulus of the punch was considered to be very rigid and the results that were obtained were compared with the literature. Afterwards, the results were discussed by making contact analysis between FG punch and FG layer which had been unprecedented in the literature.

Keywords: Functionally graded layer; Contact problem; Elastic punch; Finite element analysis; Functionally graded punch; ANSYS

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Contours to the Nonlinear Model Arising in Nonlinear Concept via SGEM

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Abstract

In this manuscript, sine-Gordon expansion method is succesfully applied to the nonlinear partial differential equation arising in nonlinear media. New contour surfaces are plotted to the model. By using several mathematical computational tools, we plots the graphics and surfaces of the results for better understanding of physical meaning of the model.

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DECOMPOSITION OF AN FUZZY NEUTROSOPHIC SOFT MATRIX USING COMPOSITION OPERATOR AND MODAL OPERATORS

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Abstract

In this talk, we study some properties of modal operations on fuzzy neutrosophic soft matrices and present some results of the necessity and possibility operators with other operators. Then we introduce a new composition operator and discuss its properties in fuzzy neutrosophic soft matrices. Finally, we obtain a decomposition of an fuzzy neutrosophic soft matrix by using the new composition operator and modal operators.

Keywords: Fuzzy neutrosophic soft set, Fuzzy neutrosophic soft matrix, Modal operators, Composition operator.

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DEFINITIONS AND BASIC PROPERTIES OF THE NEW GENERALIZATIONS OF SOME SPECIAL FUNCTIONS

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Abstract

In this study, we first introduced new generalizations of gamma and beta functions with the help of Fox-Wright function. Then by using these functions, we defined generalized Gauss and confluent hypergeometric functions. We obtained their integral representations, summation formulas, transformation formulas, derivative formulas and difference formulas. Also, we calculated the Mellin transformations of these functions.

Keywords: Gamma function; beta function; Fox-Wright function; Gauss hypergeometric function; confluent hypergeometric function.

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Determination of Thermal Waves in Living Bodies Governing with the Generalized Cattaneo Approach

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Abstract

The investigation of thermal diffusion in the living tissues requires not only the clinical experimental researches but also the accurate mathematical modeling. Therefore, it has an increasing interest during the last 50 years after the Pennes' pioneering role on modeling of bioheat transfer [1]. On the other hand, understanding of complex dynamics of bioheat transfer is quite crucial for cancer therapies under the heating effect such as Hyperthermia. In the classical model of Pennes, there are three characteristic terms such as blood perfusion, metabolic heat generation and the heat conduction. Accordingly, many new bioheat models have been introduced to improve Pennes' model and thus to overcome its weaknesses. In this sense, Cattaneo [2] and Vernotte [3] proposed a modified unsteady heat conduction equation under the consideration of finite heat propagation velocity. With this theory, the very long thermal relaxation time acting on the most of non-homogeneous biological materials has been clarified up to now. Another remarkable point that is subject to the present study is that the successfully description of abnormal heat transport occurring in most heterogeneous biological materials with fractional derivative operators [4]. Because of the non-local structure of these operators, the slow/super propagation of the heat transfer in blood flow of living tissues can be modelled accurately. By using this reality, the thermal waves arising from a constitutive bioheat equation under the effect of different boundary temperatures based on generalized Cattaneo's approach are investigated using the combined analytical and numerical schemes. The results are implemented from the physical and mathematical point of views.

Keywords: Thermal waves, generalized Cattaneo equation, bioheat transfer.

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DISCRETE AND CONTINUOUS TIME, CONVOLUTION SUM AND CONVOLUTION INTEGRAL ON TIME-INVARIANT LINEAR SYSTEM

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Abstract

In this study firstly, convolution integral and its properties which are encountered in applied mathematics, physics, and engineering and used in many initial-boundary value problems, have been considered. Later, introducing the usage of convolution integral in Laplace, Fourier, and Mellin transform and some examples have been solved. Finally, on the discrete and continuous time LTI (Linear Time-Invariant) system which is a time-invariant system, convolution sum and convolution integral have been investigated, constitueting new examples.

Keywords: Convolution, Laplace, Fourier and Mellin transforms, LTI system

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DRBEM SOLUTION FOR AN INVERSE NATURAL CONVECTION PROBLEM WITH THE VARIOUS TYPES OF BOUNDARY CONDITIONS

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Abstract

In this study, an inverse natural convection in a square cavity flow problem is examined numerically. The boundary of the cavity countains a right hostile wall on which no boundary condition can be prescribed or measured and a left accessible wall on which two boundary conditions i.e. both the boundary temperature and heat flux data are overprescribed. Dual Reciprocity Boundary Elements Method (DRBEM) is used both direct and inverse problem. Computations are carried for several values of Rayleigh number (Ra) and their results are given for three types of adiabatic boundary conditions, namely, steady heat flux, time dependent uniform heat flux and non-uniform time dependent heat flux. The effects of these boundary conditions on the solution procedure are presented by comparing the ontained results.

Keywords: Inverse problem, DRBEM, Natural convection, heat flux.

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ECONOMIC MODELS WITH MODIFIED CONFORMABLE DERIVATIVES

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Abstract

In the current paper, we investigate the economic models in which not only the market is assumed to be in equilibrium but also the expectations of agents are taken in consideration. This model mentioned is analized by means of three different types of local derivatives containing conformable derivative, beta derivative and truncated M-derivative (TMD). In an attempt to obtaion solutions with these conformable and modified conformable derivatives, the solution methods are presented for beta derivative and TMD. With the help of these tools, several novel results are acquired for abovementioned models which have substantial advantages for market equilibrium, buyers, sellers, economists and so on in point of complicated situation in economy. Furthermore, diverse graphs are showed to comprehend the results achieved.

Keywords: Economy, Market equilibrium, conformable derivative, Time paths.

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Effect of nanoparticle size and concentration on Heat transfer of nanofluid over a moving plate: Stability Analysis

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Abstract

In the present study flow and heat transfer of Ethylene Glycol and water based nano-fluids is presented. Two type of nano particles viz. Alumina and CuO are considered in different base fluids. Approriate thermal conductivity and viscosity models have been used to incorporate the effect of nano particle volume fraction, viscosity of base fluid, thermal conductivity of base fluid, nanolayer of fluid particles formed around the metal particle inside the nanofluid and the shape of the nano sized metal particles. The set of partial differential equations governing the flow are reduced to non-linear ordinary differential equations by using similarity transformations. These non-linear equations are solved by using hybridized numerical technique using soft computing techniques. The influence of nano fluid parameters, viz. nature of base fluid, nano particle material, size, concentration of nano particle in base fluid, have been analyzed and discussed on velocity distributions and temperature profiles. It is found that the dual solution exists for the present problem, therefore, eigen value analysis has been carried out to determine the stable solution. It is concluded that the nano particle concentration and nano particle size play a very important role in the nano fluid flow and heat transfer.

Keywords:

Stability analyis, PSO, Soft computing, numerical solution, similarity transformation, nanofluid, non-linear differential equations.

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Efficient intelligence techniques for solving a class of boundary value problems arising in physiology

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Abstract

In the present study, computational intelligence techniques are designed for numerical treatment of a second order nonlinear system arising in physiology using artificial neural networks (ANNs), genetic algorithms (GAs), interior-point algorithm (IPA) and their hybrid combination. The mathematical model of the equation is created using ANNs based on unsupervised error and training of the design parameters of ANNs is made with GAs, IPAs and hybrid approach GA-IPA. The applicability and reliability of proposed scheme are validated by solving different variants of boundary value problems arises in physiology. The correctness, effectiveness and reliability of the proposed approach is determined through the results of statistical analyses.

Keywords: Artificial neural networks, genetic algorithm, interior-point algorithm, mathematical biology, hybrid-computing techniques.

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ENERGY OF UNIT QUASI VECTOR FIELDS IN THE THREE DIMENSIONAL EUCLIDEAN SPACE

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Abstract

In this paper, we firstly introduce kinematics properties of moving particles lying in three dimensional Euclidean space. Then we assume that moving particles correspond to space curves in the given space. Thus, we able to investigate some intrinsic features of these particles by using the differential geometric tools. To be more specific we use a geometrical approach to obtain the energy of the moving particle lying on each unit quasi vector fields in the three dimensional space.

Keywords: Energy, Euclidean Space, Quasi Vector Fields.

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Entropy and chaos on uniform hyperspaces

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Abstract

Let (X,U)be a compact uniform space and $(2^X,2^U)$ be the space of all non-empty compact subsets of X equipped with the Hausdorff uniformity 2^U. The dynamical system (X,f)induces another dynamical system $(2^X,2^f)$, where $f:X\to X$ is a continuous map and $2^f:2^X\to 2^X$ is defined by $2^f(A)=f(A)$ for any $A\in 2^X$. In this paper we wish to relate the dynamics of the dynamical system $(X,f)$to the dynamics of the induced dynamical system $(2^X,2^f)$. In the process, we obtain conditions on the endowed hyperspace topology under which the chaotic behaviour of the map on the base space is inherited by the induced map on the hyperspace. We show that under some assumption the induced dynamical system $(2^X,2^f)$ has positive topological entropy.

Keywords: *Topological entropy, Chaos, Sensitivity, Uniform space*

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Exact Solutions for Ablowitz-Kaup-Newell-Segur Wave Equation

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Abstract

In this study, we have studied the exact solutions of Ablowitz-Kaup-Newell-Segur Wave Equation with Fourth Order by using the improved bernoulli sub-equation function method. The nonlinear partial differential equation have been applied in many branches of physics. Firstly, Ablowitz-Kaup-Newell-Segur Wave Equation which being nonlinear partial differential equation is transformed into nonlinear ordinary differential equation by using a wave transformation. Later, nonlinear ordinary differential equation is solved by improved bernoulli sub-equation method.

Keywords: Ablowitz-Kaup-Newell-Segur Wave Equation, improved bernoulli sub-equation method, exact solution.

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EXACT TRAVELLING WAVE SOLUTIONS OF KLEIN- GORDON

EQUATION USING SUB-EQUATION METHOD

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Abstract

In this paper, it is the sub-equation method which is used to obtain the new complex, trigonometric, hyperbolic and algebraic travelling wave solution of the nonlinear Klein Gordon equation known as the equation of the quantum movement. In order to obtain the three-dimensional graphs representing the stationary wave, special values are given to the parameters present in the solution. These graphs are presented using special package programs. The sub equation method is employed to achieve the goals set for this work.

Keywords: Klein-Gordon Equation, Sub-Equation Method, Exact travelling wave solution.

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EXISTENCE AND UNIQUENESS OF NONLINEAR VISCOELASTIC FOURTH-ORDER PROBLEM

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Abstract In this talk we will investigated the the existence and uniqueness of the nonlinear viscoelastic problem governed by bilaplacian operator. We denote by Ω an open subset of $\mathbb{R}^n$ with regular boundary Γ. Let Q the cylinder $\mathbb{R}^n_x \times \mathbb{R}_t$ with Q = Ω ×]0,T[; T fini, Σ boundary of Q. f, $u_0(x) and\ u_1(x)$ are functions. We look for a function $u = u(x,t)$, $x \in \Omega$, t ∈]0,T[, solution of the problem (P).

$$(P)\begin{cases} \frac{\partial^2 u}{\partial t^2} - \Delta^2 u + \int_0^t g(t-s)\Delta u(s)ds = f & \text{in } \Omega \times]0,T[\\ u(x,t) = \Delta u(x,t) = 0 & \text{on } \Sigma \\ u(x,0) = u_0(x),\ \frac{\partial u(x,t)}{\partial t}|_{t=0} = u_1(x) & x \in \Omega \end{cases}$$

Keywords: Existence, Fourth-order, Nonlinear, Priori Estimate, Uniqueness,Viscoelastic.

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EXISTENCE RESULTS FOR QUASILINEAR PARABOLIC PROBLEMS WITH L^1 DATA

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Abstract

In this work, we prove existence of entropy solution for quasilliear parabolic problem in bounded open subset Ω of $\mathbb{R}^N$, with data and u_0 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: Quasilinear parabolic problem ; fixed point; truncation function; L^1 data.

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Fan-Gottesman Compactification and Scattered Space

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Abstract

Compactification is the process or result of making a topological space into a compact space. An embedding of a topological space X as a dense subset of a compact space is called a compactification of X. There are a lot of compactification methods appling different topological spaces such as Aleksandrov (one-point), Wallman, Stone-Cech. But we study with Fan-Gottesman compactification.

A topological space X is said to be scattered if every non-empty subset S of X contains at least one point which is isolated in S.That is is scattered if and only if it is not contained non-empty subset which is dense in itself. Compact scattered spaces have found importat use in analysis and topology. Compact scattered Hausdorff spaces are characterized by Mrowka and others. In this paper, we investigate the relation between the Fan-Gottesman compactification of T_3 space and scattered space. We show under which conditions the Fan-Gottesman compactification FX is a scattered.

Keywords: Fan-Gottesman compactification, scattered spaces

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Finite Difference Schemes on Adaptive Mesh For the Singularly Perturbed Sobolev Initial and Periodic Boundary Problem

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Abstract

A finite difference method is suggested and analyzed for evolution equations of Sobolev type in a single variable and with boundary layes. Asymptotic estimates were made for the solution of Sobolev initial and periodic boundary problem with singular perturbation. For the Sobolev problem, finite difference scheme on an adaptive mesh which was accomplished by the method of integral identities with using of linear basis functions and interpolating quadrature rules with weight and remainder term in integral form were presented. The convergence and error estimates for an finite difference scheme on adaptive mesh are obtained. The theoritical results were tested on numerical example.

Keywords: Adaptive Mesh, Boundary Layers, Difference Scheme, Sobolev Problem, Singular Perturbation.

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FİXED POİNT RESULTS FOR MULTİVALUED MAPPİNGS IN TRIANGULAR FUZZY METRİC SPACES

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Abstract

In this paper, we prove some fixed point results for multivalued mappings satisfying F-contractive type conditions in complete triangular fuzzy metric spaces defined by Di Bari and Vetro. Our theorems extend and generalize some recent results in the existing literature. Also, an example is provided in support of our results.

Keywords: Fuzzy Metric Space, Triangular Fuzzy Metric Space, Multivalued Mappings, F-contractive type conditions

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Fixed point approximation of generalized nonexpansive mappings in CAT(0) spaces

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Abstract

In this study, we prove the strong and Δ-convergence theorems for generalized nonexpansive mappings in CAT(0) spaces using the iteration process which is introduced by Ullah and Arshad (J. Linear Topological Algebra, 7(2), 87-100, 2018). Our results are the extension, improvement and generalization of many well-known results in the literature of fixed point theory in CAT(0) spaces.

Keywords: strong convergence, Δ-convergence, fixed point, CAT(0) space, iteration process, generalized nonexpansive mapping.

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FRACTIONAL CALCULUS OF FURTHER GENERALIZATION OF THE EXTENDED HYPERGEOMETRIC FUNCTION

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Abstract

Here is to demonstrate some formulae of generalization of the extended hypergeometric function by applying fractional derivative operators. Also, we obtain integral transforms and generating functions for generalization of extended hypergeometric function.

Keywords: Gamma function, Beta function, hypergeometric function, extended hypergeometric function, integral transform, fractional calculus operators, generating functions.

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Boundary Value Problems for Nonlinear Impulsive Caputo–Hadamard-Type Fractional Differential Equations

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Abstract

In this paper, we establish existence, uniqueness, and stability results for the boundary value problem with nonlinear fractional differential equations with impulses

$cDt\alpha k y(t) = f(t,y,c\ Dtk\alpha\text{-}1 y(t))$, for $t \in (tk,tk+1]$, $k = 0,...,m, 1 < \alpha \leq 2$,

(1) $\Delta y|t=tk = Ik(y(t-k))$, $k = 1,...,m$,

(2) $\Delta y'|t=tk = Ik(y(t-k))$, $k = 1,...,m$,

(3) $a_1 y(1) + b_1 y(T) = c_1$

(4) $a_2 y'(1)+b_2 y'(T)=c_2$

Where $cDt\alpha k$ is the Caputo–Hadamard fractional derivative, $f : J \times R\times R\to R$ is a given function, $Ik : R \to R$, and a_1, a_2, b_1, b_2, c_1 and c_2 are real constants with $a+b\neq 0$. Here, the impulse points satisfy $1 = t0 < t1 < \cdots < tm < tm+1 = T$, $\Delta y|t=tk = y(tk+) - y(t-k)$, and $y(t+k) = \lim h\to 0+ y(tk + h)$ and $y(t-k) = \lim h\to 0- y(tk +h)$ represent the right and left hand limits of $y(t)$ at $t = tk$.

Keywords: Impulses, Fractional Dervative, Fractional Integral, Caputo Dervative.

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FUNDAMENTAL RESULTS FOR THE FUZZY BOUNDARY VALUE PROBLEM WITH THE EIGENVALUE PARAMETER IN THE BOUNDARY CONDITION

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Abstract

This paper is on the fuzzy boundary value problem with the eigenvalue parameter in the boundary condition. Fundamental results are found for eigenvalues and eigenfunctions of the problem.

Keywords: Fuzzy differential equation, Eigenvalue, Sturm-Liouville Theory.

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FURTHER PROPERTIES OF THE TRUNCATED $\mathcal{M}$-FRACTIONAL DERIVATIVE

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Abstract

Recently, by using $\mathcal{M}$-series İlhan and Kıymaz [4] introduced the truncated M-fractional derivative operator, which generalizes several fractional derivatives and satisfies important properties of the integer-order derivatives like linearity, product rule, quotient rule, function composition and chain rule. They also presented the corresponding $\mathcal{M}$-fractional integral operator and obtained the analytic solutions of ordinary and partial $\mathcal{M}$-fractional differential equations. In this study, we proved some new results for $\mathcal{M}$-fractional operators and use them to get the analytic solutions of ordinary $\mathcal{M}$-fractional differential equations which we could not solve before.

Keywords: Truncated M-fractional derivative, alternative fractional derivative, conformable fractional derivative, M-series.

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FUZZY ROUGH FUZZIFICATION IN DATA MINING AND DECISION MAKING

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Abstract

The rough set theory is a new method for decision making and data processing in situations of ambiguity and uncertainty. The Suggested method is indicated as an uncertain method for nonintegrated compression. Various theorems demonstrate how to push non-singleton fuzzification in prior fuzzy sets of the logical-type and conjunction-type fuzzy systems. In the same way, fuzzy rough fuzzification embeds in such the logical-type and conjunction-type fuzzy systems. This paper presents a practical example of data mining and decision-making show using of rough fuzzy sets theory.

Keywords: Uncertainty reasoning, Fuzzy set, Rough set, Imprecise data, Decision making, Data mining.

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GENERALISED INCOMPLETE CAPUTO FRACTIONAL DERIVATIVE OPERATOR

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Abstract

The aim of this paper is defined to generalised incomplete Caputo fractional operators and apply the some special functions. For this reason, we present new generalised incomplete hypergeometric functions and Appell hypergeometric functions and give some properties of them. Moreover, we give some images of the elementary functions using the generalised incomplete Caputo fractional derivative operator. With the help of this definition to obtain some generating functions for the generalised incomplete hypergeometric functions.

Keywords: Beta function, incomplete Beta function, extended incomplete Beta function, Pochammer symbol, incomplete Pochhammer ratios, incomplete hypergeometric function, incomplete Appell hypergeometric functions, generating functions.

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GENERALISED INCOMPLETE RIEMANN-LIOUVILLE FRACTIONAL DERIVATIVE OPERATOR

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Abstract

The aim of this paper is defined to incomplete Pochhammer ratios by means of the generalization of the extended Beta function $B_{p,q}^{(\kappa,\mu)}(x,y;\alpha)$ [3]. Using this incomplete Pochhammer ratios we present new generalised incomplete hypergeometric functions and Appell hypergeometric functions and give some properties of them. Moreover, we introduce generalised incomplete Riemann-Liouville fractional derivative operator. With the help of this definition to obtain some generating functions for the generalised incomplete hypergeometric functions.

Keywords: Beta function, incomplete Beta function, extended incomplete Beta function, Pochammer symbol, incomplete Pochhammer ratios, incomplete hypergeometric function, incomplete Appell hypergeometric functions, generating functions.

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GENERALIZED HADAMARD'S INEQUALITIES FOR TWO-DIMENSIONAL GENERAL PREINVEX STOCHASTIC PROCESSES

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Abstract

In this study, we considered primarily some generalizations of Hermite-Hadamard type integral inequalities for general preinvex stochastic processes on real number set using mean-square integrability. Starting from this point of view, we verified also generalized Hadamard's inequalities for two-dimensional general preinvex stochastic processes.

Keywords: General preinvexity, two-dimensional stochastic process, mean-square integrability, Hermite-Hadamard tye inequality

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GLOBAL ATTRACTORS FOR THE HIGHER-ORDER EVOLUTION EQUATION

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Abstract

In this paper, we consider the higher-order evolution equation. We prove the existence of the global attractors in $H_0^m(\Omega) \times L^2(\Omega)$. Later, we study the asymptotic behavior of solutions.

Keywords: Global attractors, Higher-order equation, Decay.

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GROUP CLOSENESS CENTRALITY OF GRAPHS

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Abstract

The idea of closeness centrality measure was introduced first by Bavelas (1948) and defined by Sabidussi (1966) as an inverse of sum of geodesic distances to every other vertex from each vertex within the network. The closeness centrality of a vertex v is given by $C_C(v) = \frac{1}{\sum_{u \in V} d(u,v)}$, where V be the set of vertices in the network and $d(u, v)$ is geodesic distance between the vertices u and v. Everett and Borgatti (1999) define group closeness centrality as $C_C(S) = \frac{|V \setminus S|}{\sum_{v \in V \setminus S} d(S,v)}$, $S \subseteq V$, where $d(S,v) = \min_{u \in S} d(u,v)$. The *Closeness Integrity* of a graph G is defined as $I_c(G) = \min_{S \subset V} \{|S| + m_c(G - S)\}$, where S is the maximum group closeness centrality set and $m_c(G - S)$ denotes the order of the largest component in $G - S$. In this work, we study the properties and bounds of this new parameter.

Keywords: Closeness centrality, closeness integrity.

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HIERARCHICAL CLUSTERING OF THE GLOBAL ECONOMIES IN TERMS OF INFLATION RATES

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Abstract

In this study, we apply minimum spanning tree approach to the data of inflation rates of the investigated economies. We focus on the asynchronous yearly data is between 1960 and 2017. For this purpose we use minimum spanning tree approach to monitor hierarchical clusters. In order to establish a hierarchy among the investigated economies, we apply the dynamic time warping algorithm by measuring the similarity between asynchronous time series. We present our results by hierarchical graphs.

Keywords: Minimum spanning tree, Dynamic time warping, Inflation rates

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2. Veysel Fuat Hatipoğlu, Application of a New Quantitative Approach to Stock Markets: Minimum Spanning Tree, Alphanumeric Journal, Vol:5, No:1, 165–169, 2017.

HIERARCHICAL CLUSTERING ON THE CRYPTOCURRENCY MARKET

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Abstract

In this study, we investigate the behavior of the Cryptocurrency Market between March 2015 and March 2019. For this purpose we use minimum spanning tree approach to monitor hierarchical clusters. We use the dynamic time warping algorithm to measure the similarity between time series of the investigated cryptocurrencies. We present our results by hierarchical graphs.

Keywords: Minimum spanning tree, Dynamic time warping, Cryptocurrency market

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2. Veysel Fuat Hatipoğlu, Application of a New Quantitative Approach to Stock Markets: Minimum Spanning Tree, Alphanumeric Journal, Vol:5, No:1, 165–169, 2017.

HIROTA'S DIRECT METHOD IN SOLITON THEORY

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Abstract

In this talk, we give an elementary introduction to Hirota's direct method of constructing multi-soliton solutions to integrable nonlinear evolution equations. We discuss in detail how this works for the Korteweg–de Vries (KdV) equation. We also showhow Hirota's method can be applied to other integrable equations such as the *Nonlinear Schrödinger Equation (NLS).*

Keywords: Hirota Direct method, Bilinear form

Horizontal Lift Problems in a Special Class of Semi-Tensor Bundle

Furkan Yildirim

ABSTRACT

Using projection (submersion) of the tangent bundle TM over a manifold M, we define a semi-tensor (pull-back) bundle tM of type (p,q). In this article, we also analyze horizontal lift of vector fields for special class of semi-tensor (pull-back) bundle tM of type (p,q).

Keywords: Vector field, horizontal lift, pull-back bundle**,** tangent bundle**,** semi-tensor bundle.

AMS (2010) Subject Classification: 53A45, 55R10, 57R25.

1. Introduction

Let M_n be an n-dimensional differentiable manifold of class C^∞, and let $\left(T(M_n),\pi_1,M_n\right)$ be a tangent bundle over M_n [9]. We use the notation $(x^i)=\left(x^{\bar{\alpha}},x^\alpha\right)$, where the indices $i,j,...$ run from 1 to $2n$, the indices $\bar{\alpha},\bar{\beta},...$ from 1 to n and the indices $\alpha,\beta,...$ from $n+1$ to $2n$, x^α are coordinates in M_n, $x^{\bar{\alpha}}=y^\alpha$ are fibre coordinates of the tangent bundle $T(M_n)$.

Let now $\left(T_q^p(M_n),\pi,M_n\right)$ be a tensor bundle [1], [4], [[6], p.118] with base space M_n, and let $T(M_n)$ be tangent bundle determined by a natural projection (submersion) $\pi_1:T(M_n)\to M_n$. The semi-tensor bundle (induced or pull-back) of the tensor bundle $\left(T_q^p(M_n),\pi,M_n\right)$ is the bundle $\left(t_q^p(M_n),\pi_2,T(M_n)\right)$ over tangent bundle $T(M_n)$ with a total space

$$t_q^p(M_n)=\left\{\left(\left(x^{\bar{\alpha}},x^\alpha\right),x^{\bar{\bar{\alpha}}}\right)\in T(M_n)\times\left(T_q^p\right)_x(M_n):\pi_1\left(x^{\bar{\alpha}},x^\alpha\right)=\pi\left(x^\alpha,x^{\bar{\bar{\alpha}}}\right)=\left(x^\alpha\right)\right\}\subset T(M_n)\times\left(T_q^p\right)_x(M_n)$$

and with the projection map $\pi_2:t_q^p(M_n)\to T(M_n)$ defined by $\pi_2(x^{\bar{\alpha}},x^\alpha,x^{\bar{\bar{\alpha}}})=\left(x^{\bar{\alpha}},x^\alpha\right)$, where $\left(T_q^p\right)_x(M_n)\left(x=\pi_1\left(x\right),x=\left(x^{\bar{\alpha}},x^\alpha\right)\in T(M_n)\right)$ is the tensor space at a point x of M_n,

Hybrid fiber reinforced self-compacting fly ash concrete

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Abstract

Fly ash effect on the properties of hybrid fiber reinforced self-compacting concrete was investigated, throughout this study. For this purpose, self-compacting concrete containing 2% steel fiber and brass coated steel fiber and also 0%, 0.05% and 0.1% polypropylene fibers were used to produce hybrid fiber reinforced concrete. In all mixtures, the cement was replaced with fly ash by 10 % and 15 %. For fresh concrete; flow diameter, propagation time (t50), V-funnel flow time, L-box and J ring tests have been performed. To obtain the compressive strength, the splitting tensile strength and the flexural strength relavant test were carried out. Consequently, the amount of steel and polypropylene fibers increased, the flow diameter of fresh mix decreased. Furthermore, increasing the amount of fly ash and brass coated steel fiber, incerased the flow diameter. The amount of fly ash and steel fiber increased, the splitting tensile and the flexural strength as the compressive strength.

Keywords: Self-compacting concrete, hybrid fiber, steel fiber, brass coated steel fiber, polypropylene fiber, fly ash, strength.

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Hybrid Lattice Boltzmann Finite-Difference Simulation of Non-Newtonian Fluid Flow

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Abstract

We propose numerical simulations of Non-Newtonian fluids based on a hybric algorithm combining Lattice Boltzmann models (LBM) and Finite Differences (FD) schemes, the former used to model the macroscopic equations that characterise the evolution of momentum, and the latter used to model the polymer dynamics. The kinetics of polymers is introduced using a White-Metzner model. Present hybrid scheme was firstly validated by an White-Metzner fluid in a planar channel flow, for which analytical solution can easily be obtained.

Keywords: LBM, FD, Non-Newtonian, White-Metzner Model

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IMPLEMENTATION OF NEW SUB EQUATION METHOD TO TIME FRACTIONAL PARTIAL DIFFERENTIAL EQUATIONS

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Abstract

In this present paper, we use the new sub equation method to get the exact solutions of time fractional partial differential equations where the derivatives are in conformable sense. We carried out all the computations in this paper by Wolfram Mathematica.

Keywords: Conformable Fractional Derivative, The new sub-equation method, Exact Solutions.

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Implementation of a Real Time Data Mining Classification to predict Abnormal e-health Situations for Elderly

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Abstract

Elderly chronic diseases are the main cause of death in the world, accounting 60% of all death. Because elderly with chronic diseases at the early stages has no observed symptoms, and then symptoms start to appear, it is critical to observe the symptoms as early as possible to avoid any complication. Real time techniques of machine learning and big data are very effective in designing a medical support system and enrich ability to determine the unseen patterns and provide healthcare professionals with just-in-time insight across emergency healthcare processes by performing real-time analysis on process-related data in order to better support decision making and identify potential critical risks that may affect the provision of emergency care to patients. This study aims to propose an incremental classification model in the interest of detecting the abnormal situations in clinical data. To do this we have chosen a real time decision tree algorithm named Very Fast Decision Tree (VFDT) after comparing it with other two algorithms Naive Bayes and Hoeffding tree. We have also proposed three methods in the phase of prediction for implementing VFDT. The results show that we can effectively perform a test-and-train process with a limited segment of data. In other word, Naive Bayes can classify large data with a high accuracy and speed, Hoeffding Trees allow learning in very small constant time per example, and have strong guarantees of high asymptotic similarity to the corresponding batch trees, VFDT is a high-performance data mining system based on Hoeffding Trees. Future work is to investigate why certain parameter choices give less accuracy than others. For this purpose, we aim to break down data stream mining algorithms into generic sub tasks to allow a more fine-grained comparison of the detection accuracy.

Keywords: Big data analytics, Classification technique, elderly healthcare, real time

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Incomplete Forms of Fractional Integrals and Derivatives

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Abstract

The incomplete gamma function and incomplete beta function are well known, and their connection with fractional calculus emerges from elementary functions such as power and exponential functions whose fractional differintegrals give rise to incomplete gamma and beta functions. The process of "incompletification" which forms the incomplete gamma and beta functions from the standard gamma and beta functions may be simply described by replacing an integral over an interval such as $[0,\infty)$ or $[0,1]$ with an integral over a subinterval such as $[y, \infty)$ or $[0,y]$.

The same process may be applied to fractional integrals. In real analysis, the Riemann-Liouville fractional integral is defined by an integral over an interval $[c,x]$. By replacing this interval with subintervals of itself, we obtain new fractional integral operators which are called *incomplete fractional integrals* of upper and lower type. The seminal work on this was by Özarslan and Ustaoğlu [1], who also extended this theory in [2]. They applied the newly defined incomplete fractional operators to various special functions.

A further rigorous analysis of the incomplete Riemann-Liouville fractional calculus is undertaken in this joint work. We consider the action of the new fractional operators on some L^p function spaces, which gives rise to some surprising transformation properties. We also consider carefully how to define incomplete Riemann-Liouville fractional *derivatives*, justifying our proposed definitions by verifying that several different approaches to this problem all yield equivalent solutions.

Keywords: fractional calculus; special functions; integral transforms

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INEXTENSIBLE FLOWS OF W-DIRECTION CURVES IN EUCLIDEAN 3-SPACE

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Abstract

In this paper, we construct a new method for w-direction curves of inextensible flows of curves in E^3. Using the Darboux frame of the given curve, we present partial differential equations. We give some characterizations for curvatures of a curve in E^3.

Keywords: Inextensible flows; w-direction curve; Darboux frame.

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Influence of metachronal wave on hyperbolic tangent fluid model with inclined magnetic field

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Abstract

The purpose of the present paper is to discuss the theoretical study of a non-linear problem of cilia induced flow by considering the fluid as an incompressible non-Newtonian fluid (hyperbolic tangent fluid) model with ciliated walls. The governing equations of present flow problem are simplified under the consideration of long-wavelength approximation. Regular perturbation technique is carried out to solve the simplified governing equations of hyperbolic tangent fluid model. The analytical solution is calculated for stream function and Numerical solution is calculated for the pressure rise. The characteristics of the ciliary system on tangent hyperbolic fluid are analyzed graphically and discussed in detail. It was found that when , the results of pressure rise coincide with the results of Newtonian fluid. It was also observed that the size of the trapping bolus decreases with an increase in Hartmann number and Weissenberg number.

Keywords: Ciliary motion, Metachronal wave, Modelling of hyperbolic tangent fluid model, Analytical solution, inclined magnetic field.

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INVESTIGATION OF DIFFERENT ARTIFICIAL LEARNING APPROACHES IN FINANCIAL TIME SERIES FORECASTING

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Abstract

Prediction of financial time series is a challenging task due to the noisy, complex and non-stationary nature of the financial data. In recent years, artificial learning techniques have become rapidly growing alternative methods for solving, or complementing other techniques, in the stock price forecasting problem. In this study, it is aimed to investigate the prediction of individual stock prices by applying nonlinear autoregressive network with exogenous inputs (NARX) and support vector regression (SVR). For this aim, we used the daily trade data including highest price, lowest price, closing price and trade volume for the stocks with the highest transaction volumes from Borsa Istanbul (BIST). In order to evaluate the performance of the prediction models various statistical measures were used. The results indicate that, the techniques used are quite capable in prediction the future price of a stock. Moreover, it is seen that both techniques are competitive with each other and have superiorities in different aspects.

Keywords: Artificial learning, artificial neural networks, financial time series forecasting, nonlinear autoregressive network with exogenous inputs, support vector regression.

INVESTIGATION OF NUMERICAL SOLUTIONS TO A DRINKING MODEL WITH ATANGANA-BALEANU DERIVATIVE

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Abstract

Many health or social problems occur in our world and environment owing to excessive drinking. Since mathematical models are a significant tool which can predict the process of drinking and supply the useful materials to understand the spread and control drinking attitudes, many researchers have tried to understand the so-called issue with mathematical formulas. From this viewpoint, we deal with the effect of awareness programs by media on binge drinking dynamics model presented in [1] with Atangana-Baleanu derivative and give some numerical results belonging to this model.

Acknowledgements: This work is financially supported by Balikesir University under the Grant no. BAP 2018 /064.

Keywords: Atangana-Baleanu (AB) derivative, drinking model, numerical results.

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$K(2,n)$ Torus Knots and Bitopological Set-Indexers

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Abstract

In this study, the relationship between $K(2,n)$ torus knots and bitopological set-indexer is investigated. $K(2,n)$ torus knots can be embedded into a bitopological graph which contain $2n-3$ edges (vertices) if n is odd. Thus some results have been obtained.

Keywords: Knot, torus knot, bitopological graph, bitopological set-indexer

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Krylov subspace iterative methods for the recovery of a source term in inhomogeneous anisotropic media

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Abstract

The aim of this study is to develop an efficient methodology to reconstruct a source term for elliptic equations in non homogeneous anisotropic materials, the investigated inverse problem is transformed to a non linear optimization problem solved using a regularized Levenberg-Marquardt algorithm, the functional cost presents the differences between the calculated potential in some internal points using a discontinuous dual reciprocity boundary element approximation (1) and those measured which may be contaminated by noise. The resulting non-symmetric and dense linear system of the forward problem motivates the use of Krylov subspace iterative methods, some numerical tests are presented to assess both the accuracy and the stability of the proposed procedure.

Keywords: Boundary element method, inverse problem, iterative methods, Levenberg-Marquardt algorithm

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LACUNARY AND STATISTICAL CONVERGENCE

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Abstract

In this study, we will give lacunary convergence, statistical convergence, lacunary statistical convergence and weakly lacunary statistical convergence. Also we examine some theorms with regard to this definitions.

Keywords: lacunary convergence, statistical convergence, lacunary statistical convergence.

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LAGUERRE MATRIX-COLLOCATION METHOD TO SOLVE SYSTEMS OF PANTOGRAPH TYPE DELAY DIFFERENTIAL EQUATIONS

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Abstract

In this study, an improved matrix method based on collocation points is developed to obtain the approximate solutions of systems of high-order pantograph type delay differential equations with variable coefficients. These kinds of systems characterized by the presence of linear functional argument play an important role in explaining many different phenomena and particularly, arise in industrial applications and in studies based on biology, economy, electrodynmics, physics and chemistry. The technique we have used reduces the solution of the mentioned delay system under the initial conditions to the solution of a matrix equation with the unknown Laguerre coefficients. Thereby, the approximate solution is obtained in terms of Laguerre polynomials. In addition, several examples along with error analysis are given to illustrate the efficiency of the method; the obtained results are scrutinized and interpreted.

Keywords: Laguerre polynomials and series, Matrix method, Pantograph equations, system of delay differential equations, Collocation method.

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LAYER ADAPTED MESHES FOR SINGULARLY PERTURBED CONVECTION-DIFFUSION PROBLEM WİTH DELAY

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Abstract

The purpose of this study is to present numerical difference schemes for numerical solution of initial value problem for singularly perturbed convection-diffusion problem with delay. Numerical difference schemes are investigated in uniform and non-uniform meshes. The persented methods are shown to uniformly convergent with respect to the perturbation parameter. The parameter uniform convergences are confirmed by numerical computations.
Keywords : Singularly perturbed problem, Difference scheme, Delay differential equation, Uniform convergence.

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MATHEMATICAL MODELING AND CLIMATE CHANGE EXAMPLE

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Abstract

Mathematical modeling refers to the expression of mathematical symbolic language in order to understand the functions and structures of the states that want to be analyzed. Climate models consist of basic physical laws. The problem is made more meaningful by subjecting it to the appropriate physical approach and then by mathematical discretization (physical events such as heat transfer with continuous variables such as time, distance, temperature, etc.). These mathematical expressions are transferred to computer programs called “model". Another related concept is machine learning. Machine learning is the name given to computer algorithms that model a problem according to the relevant data. The selected algorithms vary depending on the data and the structure of the problem. According to the data and observations according to the past, the curves obtained by the regression method make your forward-looking scenarios. This is the regression dependent - independent variable diversity sequence and polynomial regression. Error calculations should be taken into consideration when creating these curves. In this study, an output has been created for Elazig province as an engineering study by using the previous year data and observations of climate change and the scenarios of HadGem2-ES global climate model.

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Mathematical Modeling of HIV with Contact Tracing According to the Changes in the Infected Classes

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Abstract In this paper, we investigate the effect of contact tracing the spread of HIV in a population. The mathematical model is given as a system of differential equations with piecewise constant arguments, where we divide the population into three sub-classes: HIV negative, HIV positive that do not know they are infected and the class with HIV positive that know they are infected. This system is analyzed using the theory of differential and difference equations. The local stability of the positive equilibrium point is investigated by using the Schur-Cohn Criteria, while for the global stability we considered a suitable Lyapunov function. Our studies have shown that the system has semi-cycle behaviors, but not a structure of periodic two. Moreover, we want to analyze the case for low infection rate by using the Allee effect at time t. Several examples are presented to support our theoretical findings using data from a case study in India.

Keywords: Logistic differential equations; Stability Analysis; Periodic Behavior; Allee effect

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Mechanical and Dynamics Behaviour of Fiber and Fly Ash Reinforced Hollow Pile

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Abstract

Pile foundations are widely used typical foundation when shallow foundation is unsufficient and in order to resist high load capacity. Pile foundations are affected by environmental conditions depending on production materials (wooden, steel, , etc). In this study, the behaviour of fiber and fly ash reinforced hollow piles is examined as alternative material according to wooden, steel, etc. Hollow piles are manufactured in hollow form with a certain wall thickness of circular produced piles. Hollow piles with two different lengths (4 mm, 10 mm) and 4 different diameters (35 mm, 50 mm, 60 mm, 70 mm) have been manufactured by adding hemp, fly ash, rubber waste materials to polyester in different ratios. Nonconfined compression test was carried out in the laboratory for hollow piles produced. In order to determine the damping ratio of the pile material, plates with dimensions of 7.5x21x0.5 cm were produced. As a result of the laboratory tests, the maximum damping ratio was found to be 7.21% at plates with a 90% Polymer + 5% Fly ash + 5% Fiber mixture ratios. The maximum unconfined compressive strength value was obtained in hollow pile having a diameter of 60 mm and a mixture ratio of 75% Polymer + 25% Fly ash.

Keywords: Pile foundation, FRP, fly ash, fiber, polymer, , hollow pile, nonconfined compression test, damping ratio.

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Modeling of the Bezier Curve in VR Environment

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Abstract

Splines are an important inter-disciplinary study of both engineering science (Engineering Sciences) and computational mathematics (Computational Mathematics). When the application examples of the curves are examined, it is seen that especially the curves are found in the design stage of the objects (cars, airplanes, sea stones etc.) modeled with a physics engine. Applications developed using virtual reality (VR) technologies can produce designs as close as possible to reality. In addition, objects designed in VR environment can be examined in a multidirectional way. Nowadays, Head Mounted Display (HMD), which are developed with VR technology, can offer high definition (HD) images. Applications related to splines are generally modeled as 2D in environments, such as OpenGL. Various 2D rendering algorithms are used to display these 2D models as 3D. For this reason, studying areas with mathematical basis such as splines and manipulating the models in VR environment will be useful to provide different possibilities for the scientific field. In this study, an application for modeling the Bezier curve, which is one of the most commonly used curve, in VR environment using an HD HMD, was performed. It is provided that the users of the application are able to dynamically change the control points to reflect the characteristics of the Bezier spline. Furthermore, the similarity or differences of the modeled curve with the projections of the objects defined in the VR environment are also presented to the attention of the users. In further studies on this topic, it will be useful to include surfaces along with curves in the VR environment.

Keywords: Virtual reality, splines, Bezier spline, projection

MODIFIED ROLLER COASTER SURFACE IN MINKOWSKI SPACE

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Abstract

In this paper, new Roller Coaster surfaces according to modified orthogonal frame is investigated in Minkowski 3-space. In this method, a new roller coaster is modeled. The Gaussian curvature, mean curvature of Roller Coaster surfaces of are investigated. Then, we obtain some characterizations in the Minkowski 3-space.

Keywords: Modified orthogonal frame; Minkowski space; Roller Coaster surfaces.

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Modified Expansion Function Method for the KP-BBM Equation

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Abstract

In this study, the travelling wave solutions of KP-BBM equations were obtained by using MEFM. The solution functions are hyperbolic, trigonometric and rational. 2D and 3D graphics and contour simulations of these solution functions were obtained by using Mathematica package.

Keywords: The nonlinear equations**,** the Kadomtsov–Petviashivilli (KP) equation-Benjamin–Bona–Mahony (BBM) equation, the modified expansion function method (MEFM).

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NEW GALILEAN TRANSFORMATION FOR INVOLUTE CURVES OF BIHARMONIC CURVES IN THE HEISENBERG GROUP

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Abstract

In this paper, we introduce a Galilean transformation of involute particles of biharmonic curves in the Heisenberg group $Heis^3$. Finally, we find explicit parametric equations of Galilean transformation of involute particles of biharmonic curves in the Heisenberg group $Heis^3$.

Keywords: Galilean relativity, biharmonic curves, bienergy, Heisenberg group, symmetries.

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NEW HADAMARD TYPE INEQUALITIES VIA CONFORMABLE FRACTIONAL INTEGRAL OPERATORS

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Abstract

In this paper, some new integral inequalities of Hermite-Hadamard type are proved for log-convex and log-concave functions via conformable fractional integral operators by using the Chebyshev, Barnes-Godunova-Levin, Nehari, Anderson and some other classical inequalities.

Keywords: Conformable fractional integrals, log-convex functions, Chebyshev inequality.

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New Results in Fixed Point Theorems in Non Solid Cone Metric Spaces

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Abstract

In this article, we study the existence of fixed point theorem for mapping satisfying certain contractive conditions in partially ordered metric spaces with non-normal non solid positive cone *P* of a real normed space with empty interior having some points known as semi- interior points. Our results generalizes and modify some results in the literature.

Keywords: Positive cone, Fixed point, semi interior point

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New Solitary Wave Structures to the Zakharov-Kuznetsov-Benjamin-Bona-Mahony Equation

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Abstract

In this paper, we apply an efficient method which is sine-Gordon expansion method (SGEM) and improved Bernoulli sub-equation function method (IBSEFM) to Zakharov-Kuznetsov-Benjamin-Bona-Mahony equation. It gives some new wave simulations such as complex and exponentiel structures. We check up whether all structures verify the Zakharov-Kuznetsov-Benjamin-Bona-Mahony model. Then, we plot three and two dimensional surfaces to obtained solutions by using Wolfram Mathematica 9.

Keywords: Sine-Gordon expansion method; improved Bernoulli sub-equation function method; Zakharov-Kuznetsov-Benjamin-Bona-Mahony equation;Complex exponential; wave simulate.

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New solution of coupled Boussinesq–Burgers equations by Sine-Gordon methods

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Abstract:

In this study, we investigated coupled systems of the nonlinear partial differential equations, namely, Boussinesq-Burgers equations. The sine- Gordon expansion method is used to find the exact solutin of the generilaized Bouddnesq-Burgers equation. Compatible wave transformation reduces the governing equation to nonlinear ordinary differential equation. The homogeneous balance procedure gives the order of the foreseen polynomial-type solution that is invigorated from known Sine-Gordon equation. We obtain a variety of precise solutions from the Boussinesq-Burgers equations, including solitary wave solutions and hyperbolic functions. The results are finally concluded graphically.

Keywords: The sine-Gordon expansion method; coupled Boussonesq-Burgers equations.

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NEW TRAVELLING WAVE SOLUTIONS FOR KDV6 EQUATION USING SUB EQUATION METHOD

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Abstract

This paper proposes solving the new wave solutions of sixth order nonlinear Equation (KdV6) using sub-equation method. In this study fractional derivatives considered in conformable sense. Conformable derivative is an understandable and applicable type of fractional derivative that satisfies almost all the basic properties of known derivative with integer order such as Leibniz rule, chain rule and etc. Also conformable derivative has some superiority over other important fractional derivatives such as Caputo and Riemann-Liouville. In this paper all the computations are carried out by computer software called Mathematica.

Keywords: Conformable fractional derivative,Sub-Equation method, KdV6 equation, Wave Solution.

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NODE TOUGHNESS OF A FUZZY GRAPH

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Abstract

Fuzzy graph theory has many applications in different fields like clustering analysis, neural networks, information theory, etc. A fuzzy graph is a triplet $G: (V, \sigma, \mu)$ where V is the vertex set, σ is a fuzzy subset of V and μ is a fuzzy relation on σ such that $\mu(u, v) \leq \sigma(u) \wedge \sigma(v), \forall u, v \in V$. Although fuzzy graphs and graphs are structurally similar, modeling with fuzzy graphs is closer to the reality since the real world contains uncertainty. A network is a series of interconnected centers and transmission paths. A network can be modelled by a graph representing the centers by vertices and the links between the centers by edges. Failure of the centers or failure of the links affects the quality of service to be received over a network. Vulnerability is the endurance of the network until the transmission cut after the failure of some centers or some links. As in graph theory, vulnerability parameters are very important in applications related with fuzzy graphs. In this study, a new vulnerability parameter fuzzy node toughness is introduced and applied to some types of fuzzy graphs. For a fuzzy graph $G: (V, \sigma, \mu)$ the node toughness of G is $t_f(G) = \min_{S \subseteq \sigma^*} \{\frac{s(S)}{\omega_f(G-S)}\}$ where S is a fuzzy node cut, $s(S)$ is the strong weight of S, and $\omega_f(G - S)$ is the diminishing arc strength of G-S having at least two vertices which is the sum of the differences of the strength of connectedness that occurs between each pair of vertices having the arc strength diminished.

Keywords: Fuzzy graphs, vulnerability, toughness.

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Non-Fourier Temperature Distribution in Biological Tissues

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Abstract

Modeling of temperature distributions in biological tissues is a complicated problem since it includes various physical processes such as conduction, convection, radiation, etc. [1]. Pennes [2] proposed a model in 1948 according to a series of experiments on measuring temperatures of tissue and arterial blood in the resting human forearm, which has been approved as a standard model for heat transfer in living tissues. It was mathematically constituted by adding a linear term to account heat exchanges between blood flow and tissues to the traditional heat equation based on Fourier law. Although the simplicity of the model comes from the adding linear term, Pennes' equation is incompatible with physical reality since Fourier's law states infinitely fast propagation of thermal signal. To overcome this problem in heat conduction, some non-Fourier laws was proposed to give the relation between heat flux and temperature gradient with fractional order derivatives [3]. Considering the superiority of fractional order differential equations in modeling an environment with complex internal structure, this study concerns axis symmetric fractional order thermal process in biological tissues and obtain the analytical solution by using integral transforms. It is hoped that the results will contribute to the treatment of cancer hyperthermia and the development of clinical thermal treatment equipment.

Keywords: non-Fourier law, fractional temperature distribution, biological tissues, axis symmetric.

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NUMBER OF SHORTEST PATHS AND *n*-OMINAL COEFFICENTS

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Abstract

It is well known that Pascal's triangle represent the binomial coefficients in binomial expansion. These numbers can also be interpreted as the numbers of (shortest) paths from the given position to top element of the triangle allowed to use two types of steps in these paths (left-up and right-up steps). The binomial coefficients show, in fact, the number of shortest paths in the square grid if only grid paths, that is paths on the grid lines, are allowed, and they also give the number of shortest paths in the hexagonal grid. When diagonal steps are also allowed in the square grid, the number of shortest paths can be described by trinomial coefficients. They can be obtained also in a triangle form by summing up three neighbour elements in the previous row. We consider also further generalisations of such triangles and their elements, quadrominal and *n*-ominal coefficients. In this context, *n*-ominal coefficients of *n*-ominal expansions represent the numbers of paths from the position of the coefficient up to the top element of the tringle allowed to use *n* different types of steps, such that for trinomial coefficients, we use three types of steps, and quadrominal coefficients we use four types of steps. We also present formulae to calculate trinomial, quadrominal and *n*-ominal coefficients based on trinomial, quadrominal and *n*-ominal expansions, where the power of the sum of more than two items is computed, respectively. Multinomial expansions are also related. We give also a comparison of those values known as various ways of generalisations of the binomial coefficients.

Keywords: Pascal's triangle, Binomial coefficients, Trinomial coefficients, Quadrominal coefficients, *n*-ominal coefficients, multiominal coefficients, counting shortest paths

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NUMERICAL SOLUTION OF THE HOMOGENEOUS TELEGRAPH EQUATION BY USING GALERKIN FINITE ELEMENT METHOD

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Abstract

One dimensional homogeneous telegraph equation arises in the study of propagation of electrical signals in a cable of transmission line and wave phenomena [1,2]. The equation and its solution are of importance in many areas of applications and several numerical methods have been developed to solve the telegraph equation so far (see [3] and referenced in).

In this study, high order numerical solution of one dimensional homogeneous telegraph equation is presented using quadratic B-spline Galerkin finite element method. In the method, second and fourth order single step methods are used for the time integration, and the space variable is discretized by means of quadratic B-spline functions. The numerical example is studied to illustrate the accuracy and the efficiency of the proposed methods. The numerical results obtained by each proposed methods are compared with analytical solution by measuring the error between them.

Keywords: Galerkin finite element method, Quadratic B-spline, Telegraph equation

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NUMERICAL SOLUTION OF THIRD ORDER DIFFERENTIAL EQUATION WITH ATANGANA-BALEANU CAPUTO DERIVATIVE

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Abstract

In this paper, we consider the following third order partial differential equation in sense of Atangana-Baleanu(AB) Caputo fractional derivative

$$\begin{cases} \frac{\partial^3 u(t,x)}{\partial t^3} + k\frac{\partial^2 u(t,x)}{\partial t^2} + \frac{\partial^\alpha u(t,x)}{\partial t^\alpha} + u(t,x) = \lambda\frac{\partial^2 u(t,x)}{\partial x^2} + f(t,x), \\ 0 < x < L, \;\; 0 < t < T, \;\; 0 < \alpha \leq 1, \\ u(0,x) = g_1(x), \;\; u_t(0,x) = g_2(x), u_{tt}(0,x) = g_3(x), \;\; 0 \leq t \leq T, \\ u(t,X_L) = r_1(x), \;\; u(t,X_R) = r_2(x), \; x > X_L < X_R. \end{cases}$$

Where λ is known constant coefficient, g_1 , g_2, g_2, r_1 and r_2 are known functions and u is the unknown function. For this equation, Crank-Nicholson finite difference schemes are constructed. Then, stability estimates are presented for these differeces schemes. One example is tested for this equation by using these difference method. Finally, the exact and approximation solutions are obtained by matlab programming. Obtained numerical results are showed in the error analysis tablo.

Keywords: Third order fractional differential equation, Atangana-Baleanu Caputo derivative, Crank-Nicholson finite difference scheme, numerical solution.

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NUMERICAL SOLUTIONS OF THE FRACTIONAL BURGERS EQUATION BY FINITE DIFFERENCE METHOD

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Abstract

In this study, finite difference methods have been applied to obtain approximate solutions of the fractional Burgers equation. The fractional derivative in the equation has been considered in the Caputo form. The L1 and L2 discretization formula has been applied to the equation. To test the accuracy of proposed methods, the error norms L_2 and L_∞ have also been computed.

Keywords: Fractional order derivatives,Finite Difference methods, Fractional order Burgers equation.

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NUMERICAL SOLUTIONS OF TIME FRACTIONAL PARTIAL DIFFERENTIAL EQUATION

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Abstract

In this paper we solved the following one dimensional fractional anomalous diffusion equation,

$$\frac{\partial^{\alpha}}{\partial t^{\alpha}}U(x,t)-\frac{\partial^{2}}{\partial x^{2}}U(x,t)+U(x,t)=f(x,t),\quad t>0\ ,\ x\in[0,L].$$

with the boundary and initial conditions

$$U(0,t)=g_0(t)\ ,$$

$$U(L,t)=g_1(t)\ ,$$

$$U(x,0)=G(x)\ ,$$

by using implicit difference method based on 5-point and 3 point central space scheme with discretization in time. For the fractional calculus we used between the Caputo and the Riemann-Liouville derivative definition and the Grünwald-Letnikov operator. The stability analysis of this scheme was examined by using von-Neumann method. A comparison between exact solutions and numerical solutions was made. Some figures and tables were included.

Keywords: Fractional diffusion equation, finite difference schemes, implicit method.

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ON (λ, μ)-STATISTICAL CONVERGENCE in PARANORMED SPACES

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Abstract

The main purpose of this work is to introduce and examine the concept of (λ, μ)-statistical Convergence of double sequences in paranormed spaces and give the relations between statistical convergence and (λ, μ)- statistical convergence in paranormed spaces.

Keywords: Statistical convergence, Paranormed spaces

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ON (λ,f)-STATISTICAL BOUNDEDNESS OF ORDER α

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Abstract

The main purpose of this work is to introduce and examine the concept of (λ,f)-statistical boundedness of order α and give the realtions between statistical boundedness and (λ,f)- statistical boundedness of order α.

Keywords: Statistical boundedness, Statistical convergence, Modulus function

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ON $\Delta_p^m(f)$- STATISTICAL CONVERGENCE OF ORDER α

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Abstract

In this study, we introduce the concept of f-statistical convergence of order Δ^m by using the generalized difference operatör delta and investigate its properties. Also, we give the relationship between $\Delta_p^m(f)$–statistical convergence of order α– and $w_{q,f}(\Delta_p^m)$–summable sequences of order -α.

Keywords: Statistical convergence; Modulus function.

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On approximation properties of bi-parametric potential-type integral operators

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Abstract

In this work we study the approximation properties of the so-called bi-parametric potantial-type operators $J_\beta^\alpha \varphi$ as $\alpha \to \alpha_0^+$. These operators has been introduced by I. A. Aliev [1] and are defined as fallows:

$$(J_\beta^\alpha \varphi)(x) = \frac{1}{\Gamma(\frac{\alpha}{\beta})} \int_0^\infty e^{-t} t^{\frac{\alpha}{\beta}-1} \left(W_t^{(\beta)} \varphi\right)(x) dt, \qquad (1)$$

where $x \in \mathbb{R}^n$, $\varphi \in L_p(\mathbb{R}^n)$, $(1 \le p < \infty)$ and $\alpha, \beta \in (0, \infty)$.

Here, $\{W_t^{(\beta)} \varphi\}_{t \ge 0}$ is the β-semigroup defined by

$$(W_t^{(\beta)} \varphi)(x) = \int \varphi(x-y) w^{(\beta)}(y;t) dy \quad , (t > 0)$$

and $W_0^{(\beta)} = I$ (identity operator). The Kernel $w^{(\beta)}(y;t)$ is the inverse Fourier transform of $\exp(-t|x|^\beta)$, i.e.

$$w^{(\beta)}(y;t) = F^{-1}\left(e^{-t|x|^\beta}\right)(y); \quad x, y \in \mathbb{R}^n, |x| = \left(\sum_{k=1}^n x_k^2\right)^{1/2}$$

The β-semigroup, $W_t^{(\beta)} \varphi$ is generalization of the famous Gauss-Weierstrass semigroup (for $\beta = 2$) and Abel-Poisson semigroup (for $\beta = 1$). Furthermore, the bi-parametric potantial-type operators $J_\beta^\alpha \varphi$ generalize the famous Bessel Potentials (for $\beta = 2$) and Flett Potentials (for $\beta = 1$). For detailed information about Bessel and Flett Potentials, see [1] and [2].

The next theorem gives approximation properties of the family $(J_\beta^\alpha \varphi)(x)$ as $\alpha \to \alpha_0^+$, $(\alpha_0 > 0)$.

Theorem: Let $\varphi \epsilon L_p(\mathbb{R}^n)$, $(1 \le p < \infty)$ and the family of integral operators $J_\beta^\alpha \varphi$ be defined as (1). Then,

a) for any $\alpha_0 > 0$ and for almost all $x \in \mathbb{R}^n$

On Classification of Biharmonic Submanifolds in S^n

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Abstract

The study of biharmonic submanifolds in space forms has nowadays great importance because of Chen's conjecture meaning that any biharmonic submanifold in Euclidean space is minimal. Chen's conjecture was generalized to the fact that any biharmonic submanifold in a Riemannian manifold with nonpositive sectional curvature is minimal. In this study, we present the results recently obtained for proper biharmonic submanifolds in S^n, particularly proper biharmonic hypersurfaces with respect to the number of their distinct principal curvatures.

Keywords: Proper biharmonic, constant mean curvature, principle curvature, hypersurface, sectional curvature.

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ON DEFERRED STATISTICAL CONVERGENCE OF ORDER (α,β)

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Abstract

In this work, we introduce the concepts of deferred statistical convergence of order (α,β) and strongly r-deferred Cesàro summability of order (α,β) of complex (or real) sequences. Also, some relations between the deferred statistical convergence of order (α,β) and strongly r-deferred Cesàro summability of order (α,β) are given.

Keywords: Statistical convergence, Summability of sequences, Cesàro summability

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ON DESIGN DEVELOPABLE SURFACES ACCORDING TO BISHOP FRAME

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Abstract

A developable surface is a ruled surface having Gaussian curvature K=0 everywhere. Developable surfaces therefore include the cone, cylinder, elliptic cone, hyperbolic cylinder, and plane. By utilizing the Bishop frame, this paper proposes a new method to construct a developable surface possessing a given curve as the line of curvature of it. We analyze the necessary and sufficient conditions when the resulting developable surface is a cylinder, cone or tangent surface.

Keywords: Developable surface, Bishop frame, cylinder surfaces, cone surfaces

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ON DISCRETE FRACTIONAL SOLUTIONS FOR SECOND ORDER DIFFERENTIAL EQUATIONS

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Abstract

One of the most popular research interests of science and engineering is the Discrete fractional calculus theory in recent times. Fractional calculus is a very useful means in obtaining explicit solutions to certain homogeneous and nonhomogeneous linear differential equations.

Our aim in this study is to obtain discrete fractional solutions of the second order homogeneous and nonhomogeneous differential equation with discrete fractional calculus operator.

Keywords: Fractional calculus; Discrete fractional calculus; Ordinary differential equation.

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ON I_σ-CONVERGENCE OF SEQUENCES OF FUNCTIONS IN 2-NORMED SPACES

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Abstract

In this paper, we study I_σ-convergence of sequence of functions and investigate relationships between them and some properties such as linearity in 2-normed spaces.

Keywords: I_σ-convergence; 2 normed space, ideal.

INTRODUCTION

The concept of convergence of a sequence of real numbers has been extended to statistical convergence independently by Fast [4] and Schoenberg [15]. The idea of *I*-convergence was introduced by Kostyrko et al. [12] as a generalization of statistical convergence [4]. Gökhan et al. [8] introduced the notion of pointwise and uniform statistical convergent of double sequences of real-valued functions. Gezer and Karakuş [7] investigated *I*-pointwise and uniform convergence and I^*-pointwise and uniform convergence of function sequences and they examined the relation between them. Balaz et al. [2] investigated *I*-convergence and *I*-continuity of real functions. Balcerzak et al. [3] studied statistical convergence and ideal convergence for sequences of functions.

The concept of 2-normed spaces was initially introduced by Gahler [5,6]. Gürdal and Pehlivan [9] studied statistical convergence, statistical Cauchy sequence and investigated some properties of statistical convergence in 2-normed spaces. Şahiner et al. [16] and Gürdal [11] studied *I*-convergence in 2-normed spaces. Gürdal and Açık [10] investigated *I*-Cauchy and I^*-Cauchy sequences in 2-normed spaces. Sarabadan and Talebi [13] presented various kinds of statistical convergence and *I*-convergence for sequences of functions with values in 2-normed spaces. Recently, Savaş and Gürdal [14] concerned with *I*-convergence of sequences of functions in random 2-normed spaces and introduce the concepts of ideal uniform convergence and ideal pointwise convergence in the topology induced by random 2-normed spaces, and gave some basic properties of these concepts. Arslan and Dündar [1] investigated the concepts of *I*-convergence, I^*-convergence, *I*-Cauchy and I^*-Cauchy sequences of functions in 2-normed

ON INEXTENSIBLE FLOWS OF TRANSLATION SURFACES ACCORDING TO BISHOP FRAME

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Abstract

In this paper, we introduce a new version of inextensible flows translation surfaces in Euclidean space. Using the Bishop frame of the given curve, we present partial differential equations. We give some characterizations for curvatures of a curve in Euclidean space.

Keywords: Bishop frame, Translation surfaces, Curvatures, Flows.

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On Mathematical Background of Grover's Quantum Search Algorithm

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Abstract

Due to the superposition principle of quantum mechanics, quantum algorithms can solve problems crucially faster than the classical counterparts which results in having great significance in computer science. One of the most important algorithms in quantum computing is Grover's search algorithm which searches an unsorted list of N items for a specific element with the running time $O(\sqrt{N})$ while N quaries, in other words, $O(N)$ steps are needed for any classical algorithms. In this study, we review the basics of quantum computing and give the fundamentals of Grover's quantum search algorithm.

Keywords: Superposition principle, measurement, Hadamard operator, qubit, tensor product

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On solutions for two different types of the fractional Boussinesq-Like equations by using conformable derivatives

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Abstract

In this paper, the extended direct algebraic method (EDAM) are used to solve two fractional Boussinesq-like equations by means of conformable derivatives. Firstly, these fractional equations are changed into the ordinary differential equations by using the traveling wave transformation. Then new solutions are obtained by using EDAM.

Keywords: Boussinesq-like equations, Conformable derivative, The extended direct algebraic method.

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ON SOME ESTIMATIONS FOR QUASI-GEOMETRICALLY CONVEX FUNCTIONS VIA CONFORMABLE FRACTIONAL INTEGRALS

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Abstract

We have established some new integral inequalities for mappings whose derivatives of absolute values are quasi-geometrically convex functions via conformable fractional integral operators. Our estimations offer some generalizations of the previous results.

Keywords: Conformable fractional integrals, quasi-geometrically convex functions, Hadamard type inequalities.

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ON SOME OPERATIONS OF SOFT SETS

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Abstract

Molodtsov [1] introduced the concept of soft set, which can be seen as a new mathematical approach to solve uncertainties in many field. Maji and et al. [2] defined the notions of union and intersection of soft sets. Ali and et al. [3] defined operations on soft sets such as restricted intersection, restricted union, extended intersection. In this study, first we give the notion of the different of two soft sets, which is slightly different from that in [4]. Then, we give the interrelations between the different operation and the other operations on soft sets. Finally, we give an example on the use of soft sets in real sector.

Keywords: Soft set, Difference of soft sets, Union of soft sets, Restricted intersection, Restricted union, Extended intersection

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ON STATISTICAL CONVERGENCE OF DİFFERENCE DOUBLE SEQUENCE OF FRACTİONAL ORDER

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Abstract

The main purpose of this study is to introduce and examine the concept of statistical convergence of difference double sequence of fractional order and give the realtions between statistical convergence .

Keywords: Fractional Difference , Statistical Convergence

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On the novel travelling wave behaviors to the (2+1)-dimensional cubic Klein-Gordon and modified Zakharov-Kuznetsov equations

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Abstract

In this article, analytical solutions of the (2+1)-dimensional cubic Klein-Gordon and modified Zakharov-Kuznetsov equations are found by using the extended sinh-Gordon expansion method. All the reported solutions in this study verify their corresponding equation. We also plot the 2D and 3D graphics to the obtained solutions. Remarkable results are obtained from solutions of these equations. Also, these results show that some events such as various nonlinear wave phonemena in the solid state physics or losses in signal dispersion of optical fibers can be modelled the extended sinh-Gordon expansion method. This method is an efficient method for solving nonlinear evolution equations.

Keywords : The sinh-Gordon expansion method; cubic Klein-Gordon equation; modified Zakharov-Kuznetsov equation.

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ON THE SOLITARY WAVE SOLUTIONS TO THE (2+1)-DIMENSIONAL DAVEY-STEWARTSON EQUATIONS

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Abstract

In this article, by using the extended sin-Gordon equation expansion method, we build the analytical traveling wave solution of the (2 + 1)-dimensional Davey-Stewartson equation system. First of all, the imaginary (2+1)-dimensional Davey-Stewatson system is transformed into a system of nonlinear differential equations, After the resulting sin-Gordon equation is applied, the homogeneous method of balance between the highest power and the highest derivative of the ordinary differential equation is authorized, and finally the outcomes equations are solved in order to achieve some new analytical solutions. Wolfram Mathematica 11.3 is used for different cases as well as for different values of non - zero constants to investigate the solutions of the resulting system of nonlinear differential equation. The results of this study are shown in 3D dimensions graphically.

Keywords: The extended Sin-Gordon; Imaginary Davey-Stewatson equation; homogenous balance method.

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ON THE SOLVABILITY OF A PROBLEM OF THE HEAT CONDUCTION THEORY WITH TWO NON-LOCAL CONDITIONS

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Abstract

In this paper, the solvability of a problem of the heat conduction theory with two non-local boundary conditions is studied. Systems of eigenfunctions of the corresponding operator with two non-local boundary conditions are investigated. A theorem on the solvability of the problem of the theory of heat conduction with two non-local boundary conditions is proved.

Keywords: homogeneous boundary value problem , mixed problem heat equation , eigenvalues , eigenfunctions , expansions in eigenfunctions , the Riesz basis , solvability of boundary value problems.

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OPTIMAL COMPUTING BUDGET ALLOCATION FOR MULTI-OBJECTIVE OPTIMIZATION PROBLEM

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Abstract

We consider the problem of multi objective stochastic optimization problem at which several objective need to be optimized simultaneously. Of course, there may be no single solution that solves all objectives. The concept of Pareto optimality is used to construct a set that contains all non-dominated solutions; the solutions that no other solutions have better performance in all objectives [1, 2]. Since the problem is stochastic in nature, therefore, simulation is the main tool to estimate the objective function values for all solutions for all objective functions. In this paper, we use the idea of the optimal computing budget allocation (OCBA) which is a computational tool proposed by Chen et. al [3] that is used to distribute the available computational time on the set of solutions with the aim of maximizing the probability of correctly selecting the best solution(s), P(CS). We use two error types that depend on Pareto and non-Pareto sets. When the error in these two types approach zero, then P(CS) is maximized. We derive new error bounds and compare them with that of the existing one of Lee et. al [4]; the numerical results show that the proposed method gives better performance.

Keywords: Multi Objective Optimization, Pareto Optimality, Simulation.

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OPTIMAL CONTROL OF TIME DEPENDENT NAVIER-STOKES EQUATIONS WITH STABILIZATION

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Abstract

In this paper, optimal control of the time dependent Navier-Stokes equations are studied and solved by using a stabilized finite element method. As for stabilization, variational multiscale stabilization (VMS) is considered. At first, the first order continuous optimality conditions are obtained. The function based approach optimize-then-discretize is used to get the optimality conditions. So that, the optimality system consists of the state and adjoint equations as coupled by an algebraic equation. Since the adjoint equation of the Navier-Stokes problem is a convection diffusion type system, the same stabilization is applied to it. Crank-Nicholson time discretization is used to get the fully discrete scheme. In order to handle the non-linearity in the state equation, we use a Newton-type linearization. We perform a numerical example to show the efficiency of the VMS method. We use nonlinear conjugate gradient method to solve the optimization problem. All computations are carried out with finite element software package Freefem++. Numerical example verifies the efficiency of the stabilization for higher Reynolds numbers.

Keywords: Optimal control, Navier-Stokes eqution, VMS method

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OPTIMAL PERTURBATION ITERATION TECHNIQUE for SOLVING BOUSSINESQ–BURGER EQUATIONS

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Abstract

In this work, we construct a new scheme for solving nonlinear partial differential equations using the theory of perturbation and optimization. We specifically analyze the semi-analytical solutions of Boussinesq–Burger equations. The new obtained solutions reveal that this new process is very effecctive to solve these kinds of nonlinear partial differential equations.

Keywords: Perturbation techniques, optimization, Boussinesq–Burger equations

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Optical solitons by modified mapping method for two types of the nonlinear Schrödinger's equation

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Abstract

In this paper, the process of modified mapping methods are applied to obtain optical solitons for the nonlinear Schrödinger's equations. These equations are unstable nonlinear Schrödinger's equation and modification of unstable nonlinear Schrödinger's equation. The obtained solutions are derived using Jacobi's elliptic functions for two di□erent value of the modulus and are obtained the some soliton solutions. These solutions are identified bright optical soliton, dark soliton, singular soliton, combo soliton solution and periodic solutions.

Keywords: Optical solitons, Nonlinear Schrödinger's equations, Modified mapping method.

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Path-Independent Option Price Convergence to Path-Dependent Option Prices with the Cox, Ross, and Rubinstein model

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Abstract

Barrier and lookback options have been the subject of numerous publications that describe, quantify, and improve the known slow and oscillatory convergence of the value of these options to their Black-Scholes limit, when they are evaluated with the Cox, Ross, and Rubinstein (CRR) tree method. However, we explicitely describe path independent European options whose value is precisely equal to the value of their path-dependent counterparts. Applying the tree method to these options, we obtain a convergence of order 1/n to the barrier and lookback options, improving from a convergence of $1/\sqrt{n}$ in the usual method. Moreover, we find an explicit error formula for this convergence, up to a term of order $1/n^{3/2}$, so that the corrected model actually converges at a speed of $1/n^{3/2}$. The talk is based on [4].

Keywords: Black-Scholes, exotic, barrier, lookback, binomial, path dependence, convergence

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PREDICTION OF HEPATITIS B IMMUNIZATION USING THE GENETIC ALGORITHM

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Abstract

In this study, an unsupervised clustering algorithm based on Genetic Algorithm (GA) is created to diagnose hepatitis B immunization. Hepatitis B immunization can be classified in three different types as no immunity, natural immunity, and immunity due to vaccine. Dataset consisting of 7728 test results according to the amount of Hepatitis B surface antigen (HBs Ag), Antibody to Hepatitis B core protein (Anti HBc), and Antibody to hepatitis B surface protein (Anti HBs) in blood for each individual was provided from a public health organization. The aim of this study is to estimate immunity types of individuals by using the clusters generated by the algorithm. Unlike the one-dimensional chromosome structure used in the GA in literature, a two-dimensional chromosome model is developed in this study. In this respect, the new approach to the GA is analyzed and the accuracy rate of the algorithm is discussed in detail.

Keywords: Clustering, Genetic Algorithm, Hepatitis B

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PROJECTABLE LINEAR CONNECTION IN SEMI-TANGENT BUNDLE

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Abstract

Using the fiber bundle M over a manifold B, we define a semi-tangent (pull-back) bundle tB. The main purpose of this paper is to investigate complete and horizontal lift problems of projectable linear connection for semi-tanjant (pull-back) bundle tB.

Keywords: Vector field, complete lift, projectable linear connection, pull-back bundle, semi-tangent bundle.

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Properties of Binary Operations of Piecewise Linear Fuzzy Numbers of Order *n*

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Abstract

Fuzzy set theory has been getting a great interest and many applications since it was found by Zadeh [1]. It helps to study and represent vague data with unclear boundaries mathematically. A special type of fuzzy sets is the fuzzy numbers, which are normalized fuzzy sets [2]. Many types of fuzzy numbers were studied in the literature and applied in many mathematical fields [3]. In a previous work of Tuffaha and Alrefaei [4], the piecewise linear fuzzy number of order n (PLFN-n) has been introduced. This fuzzy number was shown to generalize some of the mostly used types of fuzzy numbers. A ranking function and convenient binary operations have been defined on the PLFN-n. The binary operations were shown to overcome some disadvantages of previous binary operations found in the literature. In this paper, a ranking equivalence relation is introduced on the set of all piecewise linear fuzzy numbers of order n, where two PLFN-n's are equivalent if and only if their ranking values are equal. Then, the set of the equivalence classes with two operations is shown to be a field. Matrices of PLFN-n with binary operations on them are also introduced and shown to be well defined. Finally, some properties about inequalities on PLFN-n are given.

Keywords: Fuzzy Numbers, Piecewise Linear Fuzzy Numbers, Equivalence Relation

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Properties of the Banach algebra obtained from a given Banach algebra by using a left multiplier

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Abstract

The concept of a multiplier first appears in harmonic analysis in connection with the theory of summability for Fourier series. Subsequently, the notion has been employed in other areas of harmonic analysis, such as the investigation of homomorphisms of group algebras, in the general theory of Banach algebras, and so on. Many authors generalized the notion of a multiplier in different ways. Linear mapping $T: A \to A$ is called a multiplier of A if

$$T(ab) = (Ta)b \quad (= a(Tb))$$

holds for all $a, b \in A$. Note that a multiplier on is said to be power bounded if $\sup_{n\geq 0}\|T^n\| < \infty$. For a Banach algebra A and a power-bounded multiplier T of A, there is a new Banach algebra A_T, related to A and T. We investigate the relationship between the Banach algebras A and A_T.

Keywords: Banach algebra, multiplier, power-bounded operator.

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PROTOTYPE TRAVELLING WAVE SOLUTIONS OF BURGERS-FISHER EQUATION

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Abstract

In this study, we apply $(1/G')$-expansion method to the Burgers-Fisher equation. We obtain some travelling wave solutions such as new hyperbolic trigonometric travelling wave solutions. We plot three dimensional surfaces of the results by using computer package program. At the end of this manuscript, we submit a conclusion in the comprehensive manner.

Keywords: Fisher Equation, $(1/G')$-expansion method, hyperbolic trigonometric travelling wave solutions.

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Proximal method for low rank dictionary learning with application to image recovery

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Abstract

The purpose of this paper is to study low rank dictionary learning which is formulated as a minimization of the sum of a fidelity term and a nonsmooth regularization function. We consider a proximal method also knwon as Forward-Backward Splitting method (FBS) to develop an algorithm that adresses the low rank dictionary learning optimization problem. The proximal methods are specifically tailored to optimize an objective which written as the sum of a smooth differentiable function with Lipschitz-continuous gradient, and a nondifferentiable function . We consider the image recovery as a simple application to demonstrate the effectivness of the proposed algorithm.

Keywords: Proximal methods, Dictionary learning, Low rank, Image reocery

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PYROLYSIS OF THERMOELECTRIC FLUID VIA FRACTIONAL APPROACH OF CAPUTO-FABRIZIO

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Abstract

This manuscript aims to present dynamical investigation of an incompressible thermoelectric fluid based on fractional approaches of Caputo-Fabrizio. The mathematical modeling is achieved in terms of fractionalized coupled fourth order partial differential equations. An analytical investigation for velocity field is established through Fourier sine and Laplace transform by setting suitable imposed conditions. For avoiding the lengthy and cumbersome mathematical expressions, we used Cardano's method for simplified expressions of solutions of velocity field. The analytic solutions for velocity field have been expressed via elementary exponential functions in presence of magnetic and non-magnetic effects. The involvement of magnetic field and few rheological parameters are focused with and without fractional techniques graphically. Our findings have detected a reasonable cause for suitability, authenticity and applicability of fractional approaches of Caputo-Fabrizio on pyrolysis of thermoelectric fluid flow.

Keyword: thermoelectric fluid, fractional operator of Caputo-Fabrizio, Transforms, Magnetohydrodynaics.

RECTIFYING CURVES IN THE EQUIFORM GEOMETRY OF THE GALILEAN 4-SPACE

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Abstract

In this paper, we study the called rectifying curves in the equiform differential geometry of Galilean 4-space. A curve is said to be a rectifying curve if, in all points of the curve, the orthogonal complement of its normal vector contains a fixed point. If this fixed point is chosen to be the origin, then this condition is equivalent to saying that the position vector of the curve in every point lies in the orthogonal complement of its normal vector. Here we characterize rectifying curves in the equiform geometry of the Galilean 4-space.

Keywords: Rectifying curve, Galilean space, Equiform geometry.

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

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Abstract

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), 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.

Keywords: Simple image deconvolution, Bayesian approach, MAP, Regularization, GCV method.

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Reproducing kernel method with Chebyshev polynomials for fractional two-point boundary value problem

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Abstract

In this research, we present reproducing kernel method with Chebyshev polynomials for solving fractional two point boundary value problem. We obtain an approximate solution by given method. Additionally derivatives of approximate solution are also uniformly convergent to the derivatives of exact solution. The results indicate that the proposed method very efficient for fractional two point boundary value problem.

Keywords: Reproducing kernel; Chebyshev polynomials; Boundary value problem.

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Resonance of periodic combination antiviral therapy and intracellular delays in virus model

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Abstract

There is substantial interest in detailed models of viral infection and antiviral drug kinetics in order to optimize treatment against viruses such as HIV. In this talk, we consider within-viral dynamics under general intracellular distributed delays and periodic combination antiviral therapy. The basic reproduction number R_0 is established as a global threshold determining extinction versus persistence, and spectral methods are utilized for analytical and numerical computation of R_0. We derive the optimal maturation delay for virus and optimal phase difference between sinusoidally varying drug efficacies under various intracellular delays. Furthermore, numerical simulations are conducted utilizing realistic pharmacokinetics and gamma-distributed viral production delays for HIV. Our results demonstrate that the relative timing of the key viral replication cycle steps and periodic antiviral treatment schedule involving distinct drugs all can interact to critically affect the overall viral dynamics.

Keywords: mathematical biology; antiviral treatment; optimization; distributed delay differential equation; dynamical systems; Fourier analysis

SCHWINGER VARIATIONAL PRINCIPLE APPLIED TO THE EXCITATION OF HELIUM-LIKE $Ar^{16+}(1s^2)$ IONS BY IMPACT OF NEUTRALS AT 13.6 MeV/u

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Abstract

Schwinger variational approach to the process of direct electronic excitation of atoms by impact of ions at intermediate velocities regimes was shown to be very successful in predicting the saturation effect of excitation cross sections when the projectile charge is increased [1-4]. In our approach, this new procedure is based on the fractional form of the Schwinger variational principle and applied to calculate excitation cross sections of the levels (1s,2s), (1s,2p), (1s,3s), (1s,3p), (1s,3d) of $Ar^{16+}(1s^2)$ ions impinging at 13.6 MeV/u (v=23 a.u) on various gases (He, N_2 , Ne, Ar, Kr, Xe). Our theoretical calculations (First Born, second Born and Schwinger approximations) stay in good agreement with experimental data of Adoui *et al*. [5] and Venhert *et al*. [6].

Keywords: Schwinger Variational Principle, atomic excitation, Cross section.

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Second Binormal Motions of Inextensible Curves in 4-dimensional Galilean Space

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Abstract.
In our study, we give the associated evolution equations for curvature and torsion as a system of partial differential equations. In addition, we study second binormal motion of inextensible flows curves in 4-dimensional Galilean space.

Key Words: inextensible curves, second binormal vector motion

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SELECTION OF OPTIMAL THRESHOLD VALUE IN BINARY CONSTRUCTION OF BIOLOGICAL NETWORKS

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Abstract

The assessment of network models is done via the binary undirected graphical representation whose construction is done either the correlation or the covariance-variance matrix. So in order to convert the numerical entries of these matrices into a binary form, a threshold or cut-off value is used. In this respresentation, 0 implies no interaction between the two associated species of the system and 1 stands for the physical or functional interaction between the underlying two species. There are different approaches in the literature to define the threshold value for the biological networks. Kappa mximized threshold and maximized sum threshold are some of these well-known approaches in the field. In this study, we suggest a new rule for the choice of the optimal threshold by considering the topology of the system. We propose a nonparametric procedure by taking into account the sparsity of the random network or sparsity of the scale-free network. We evaluate the performance of our rule by comparing the results of its alternates in the application of bench-mark protein-protein interaction networks under different dimensions with respect to the distinct measures of accuracy.

Keywords: Threshold selection, graphical model, biological systems

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SEMI-ANALYTICAL INVESTIGATION of COUPLED DRINFEL'D-SOKOLOV-WILSON EQUATIONS

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Abstract

In this study, a new investigation of Drinfel'd-Sokolov-Wilson equations is performed via optimal perturbation iteration technique. Artificial parameters and perturbation theory are first combined to handle with partial differential equations. Then, the proposed scheme is employed to get new semi-analytical solutions of Drinfel'd-Sokolov-Wilson equations.

Keywords: Optimal perturbation iteration techniques, Drinfel'd-Sokolov-Wilson equations

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Sharaf Al-Din Al-Tusi Numerical Solutions of Polynomial Equations

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***keywords*: Tusi, Numerical, Polynomial**

Abstract

This paper presents Sharaf Al-Din Al-Tusi's method to find the real roots of polynomial equations numerically by successive steps. Though he applied his method to certain examples of polynomials of second and third degrees, it is easy to generalize his method for any degree n > 1; which we shall do. Moreover, we show that Tusi and other Islamic mathematicians applied numerical solutions ahead of Viète and other European mathematicians by centuries.

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SIMULATION OF A HOMOMORPHIC ENCRYPTION SYSTEM

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Abstract

Cryptology is defined as the science of making communication incomprehensible to third parties who have no right to read and understand the data or message.

Widespread use of cloud computing raises the question whether it is possible to delegate processing of data without giving access to it. However, Homomorphic encryption allows to perform computations on encrypted data without decryption.The computer will perform the computation on this encrypted data, without knowing anything on its real value. The decrypted result will be equal to the intended computed value. In this paper, homomorphic encryption and their types are reviewed. Also, a simulation of a somewhat homomorphic encryption is examined.

Keywords: Homomorphic Encryption, Cloud Computing, Cryptology

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SINGULAR EIGENVALUE PROBLEM WITH MODIFIED FROBENIUS METHOD

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Abstract

In this paper, we obtain the solutions of fractional power series around regular singular point x=0 of conformable eigenvalue problem for singular Sturm Liouville operator, then we compare solution of series with ordinary solution. We analyze the obtaained solutions.

Keywords: Conformable derivative; Frobenius Method; Eigenvalue.

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Soft Topological Polygroups

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Abstract

The theory of algebraic hyperstructures, proposed by Marty in 1934, is regarded as a generalization theory of algebraic structures. This study aims to introduce the notion of soft topological polygroups by presenting a topological view to the interface of soft set theory with polygroups which is one of the hyperstructure. Moreover, the notions of soft topological subpolygroups and normal soft topological subpolygroups are described, and some related features are examined in detail.

Keywords: Soft set, soft group, polygroup, soft polygroup, topological polygroup, soft topological polygroups.

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Solitary Wave Solutions and Convergence Analysis to the Local *M*-Fractional KdV Equation with Dual Power Law Nonlinearity

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Abstract

In this study, we investigate the local *M*-fractional KdV equation with dual power low nonlinearity by using the extended rational sine-cosine/sinh-cosh method. Varieties of solitary wave solutions are successfully constructed. The convergence analysis of the studied nonlinear model is also presented.

Keywords: *M*-fractional KdV equation; Solitary waves; Convergence analysis

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Solitary Wave Solutions and Convergence Analysis to the Local *M*-Fractional Simplified MCH Equation

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Abstract

In this study, we investigate the local *M*-fractional simplified MCH equation by using the extended rational sine-cosine/sinh-cosh method. Varieties of solitary wave solutions are successfully constructed. The convergence analysis of the studied nonlinear model is also presented.

Keywords: *M*-fractional simplified MCH equation; Solitary waves; Convergence analysis

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Soliton solutions for the discrete electrical lattice with conformable derivative

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Abstract

In this paper, we present new soliton solutions for the discrete electrical lattice possessing conformable derivative. The Ricatti Bernoulli (RB) sub-ODE method is applied to reach such soliton solutions for the underlying equation. Moreover, the constrain conditions for the obtained solitons have been reported.

Keywords: discrete electrical lattice; soliton solutions; conformable derivative.

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SOLUBLE PRODUCT OF PARAFREE LIE ALGEBRAS AND ITS RESIDUAL PROPERTIES

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Abstract

The parafree Lie algebras are an extraordinary class of Lie algebras which shares many properties with a free Lie algebra. In this work, we turn our attention to soluble product of parafree Lie algebras. We show that soluble product of parafree Lie algebras is parafree. Furthermore, we investigate some residual properties of soluble product of parafree Lie algebras.

Keywords: Parafree Lie algebras, Soluble product, Residual property

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Solutions of New Type Fractional Order Gas Dynamics Equations

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Abstract

We implement the reproducing kernel method to study gas dynamics equations of arbitrary order. Some experiments are given to show the applicability of the reproducing kernel method. Atangana and Baleanu presented an interesting fractional operator in 2016 which is based on the exponential kernel. We construct some reproducing kernel Hilbert spaces for solutions of fractional order Gas dynamics equations with Atangana and Baleanu derivative.

Keywords: Gas Dynamics Equations; Atangana–Baleanu fractional derivative; Fractional differential equations.

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SOME APPLICATIONS RELATED TO MATHEMATICAL MODELING OF MICROBIAL INACTIVATION IN FOOD MICROBIOLOGY

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Abstract

Knowing the change in the count of microorganisms depending on the conditions in food is one of the most important subjects of food safety in food microbiology. Models use mathematical functions and equations for the behavior of microorganisms in food. Thus, these models make it easy to understand of changes occur and allow the explanation. In addition, predictive microbiology including mathematics and microbiology is very important in determining the quality and shelf life of foods by using mathematical models and equations. Microbial modeling is important in terms of providing quick results in food in research and development stages. These inactivation models are widely used in the food industry to ensure the reliability and quality of the food. In the production of better quality, durable and healthy foods, modeling becomes important. Various mathematical models have been developed to prevent the development of microorganisms in recent years. The models used to achieve meaningful results in a short time will be in a very important position in the food industry in the future. According to the experimental results obtained in this study, some applications related to mathematical modeling of microbial inactivation in food microbiology will have been explained.

Keywords: Food microbiology, Microbial inactivation, Mathematical modeling

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SOME EXPERIMENTS WITH SINGULARLY PERTURBED PDE's EMPLOYING SCEM+FEM

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Abstract

In this presentation, numerical behavior of singular perturbed two-dimensional partial differential equations (PDE's) that depend on a positive small parameter ε is investigated. An efficient semi-analytic method that combines the well-known Finite Element Method (FEM) and an asymptotic approach so-called Successive Complementary Expansion Method (SCEM) is employed for numerical simulations of the singularly perturbed PDE's.

Keywords: Asymptotic approximation, singular perturbation, finite element, SCEM.

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SOME LOWER BOUNDS FOR FIRST ZAGREB INDEX

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Abstract

The first Zagreb index M_1 of a graph G is equal to the sum of squares of degrees of the vertices of G. We obtain that improved lower bounds for the first Zagreb index M_1 of any connected graph with cyclomatic number $\gamma \geq 0$. In addition , some special results are given for $\gamma=0,1,2$, which directly can be extended for $\gamma>2$.

Keywords: Degree (of vertex), Zagreb index , first Zagreb index, unicyclic graphs, bicyclic graphs.

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SOME NOTES ON VECTOR FIELDS IN TANGENT BUNDLE

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Abstract: The purposes of this paper are threefold. The first is to give a brief according to the special kind of infinitely small transformation of the one-parameter group. The second is to study vertical and horizontal vector fields to be an infinitesimal affine transformation in $T(M)$. The last is to investigate vertical, complete and horizontal vector fields to be an harmonic vector fields with respect to ${}^{H}g$ in $T(M)$.

Key words and phrases: Lift, Riemannian Manifold, Tangent Bundle, Infinitesimal Affine Transformation, Harmonic Vector Field.

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SOME NOVEL SOLUTIONS OF THE COUPLED WHITHAM-BROER-KAUP EQUATIONS

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Abstract

The shallow water equations have a wide range of applications in ocean, atmospheric modeling, and pneumatic computing, which can also be used to modeling flows in rivers and coastal areas. In this study, we build the analytic traveling wave solution of the (1+1) dimensional coupled Whitham-Broer-Kaup (WBK) equations, by using the Bernoulli sub-equation function method. The system of (1+1)-dimensional (CWBK) partial differential equation is converted into a ordinary differential equation for obtaining new exponential prototype structures. We obtained new results using this technique. We plotted two and three-dimensional surfaces of the results using Wolfram Mathematica 11.3. At the end of this study, we submitted a conclusion in a comprehensive manner.

Keywords: Non-linear Whitham-Broer-Kaup (CWBK) equations; Bernoulli sub-equation function method; Exponential function solution.

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Some problems which include diamond type derivative on time scales

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Abstract

In this study, we consider diamond-alpha Sturm-Liouville problem on a time scale. Throughout study, we generalize some fundamental spectral properties of classical Sturm-Liouville problem to diamond alpha type derivatives. Eventually, we obtain a valuable asymptotic expansion for eigenfunction of this problem on a time scale.

Keywords: Time scale, diamond-alpha calculus, Sturm-Liouville Problem

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SOME RELATIONS BETWEEN THE SETS OF *f*-STATISTICALLY CONVERGENT DIFFERENCE SEQUENCES

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Abstract

In this study we establish the relations between the sets of difference sequences which are f – statistically convergent in connection with modulus functions.

Keywords: density; modulus function; difference sequence; statistical convergence

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SOME RELATIONS BETWEEN THE SETS OF f-STRONGLY CESARO SUMMABLE SEQUENCES

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Abstract

In this study we establish the relations between the sets of $f-$ strongly Cesaro summable sequences and $f-$ statistically convergent sequences in connection with modulus functions.

Keywords: density; modulus function; strong Cesaro summability; statistical convergence.

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SOME RELATIONS BETWEEN THE SETS OF f-STATISTICALLY CONVERGENT SEQUENCES

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Abstract

In this study we establish the relationship between statistically convergent and statistically bounded sequence sets defined by modulus functions.

Keywords: density; modulus function; statistical convergence; statistical boundedness.

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SOME REMARKS CONCERNING DIAGONAL LIFTS IN THE SEMI-COTANGENT BUNDLE

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Abstract. In this study, we study some properties of diagonal lift of tensor fields of type (1,1) in semi-cotangent bundles with respect to adapted frames.

Key words and Phrases. Vector field, complete lift, diagonal lift, pull-back bundle, cross-section, semi-cotangent bundle.

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SOME RESULTS RELATED TO MATRIX COMMUTATORS INVOLVING TRIGONOMETRIC MATRIX FUNCTIONS

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Abstract

Commutator of two matrices is defined as $[A,B]=AB-BA$ where $A,B\in M_n(\mathbb{C})$. Böttcher and Wenzel showed that the best possible constant c in the norm inequality $\|[A,B]\|_F \le c\|A\|_F\|B\|_F$ is $\sqrt{2}$ where F stands for frobenius norm. In [1], we have obtained some results related to the commutators $[e^A,B]$ and $[e^A,e^B]$. Our aim in this study to obtain some results on the frobenius norms of $[\sin(A),B]$ and $[\cos(A),B]$ where A and B are $n\times n$ real symmetric and skew symmetric matrices.

Keywords: Matrix Commutator, Matrix Functions, Frobenius Norm

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SOOT MODELLING PERFORMANCES IN TURBULENT NON-PREMIXED ETHYLENE FLAME: A COMPARATIVE STUDY

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Abstract

More than 80% of the current world's energy consumption is supplied from combustion of fossil fuels (natural gas, oil and coal). In the present engineering applications, combustion almost always takes place is associated with highly turbulent flows as turbulent mixing increases the burning rates. Unfortunately, in addition to providing a beneficial impact on the development of human civilisation, combustion is also a major source of damage to the human and natural environment. Large amounts of pollutants are formed and their direct emission to the atmosphere affects the quality and condition of the human lives as well as the environment. With the development of computational fluid dynamics, modelling soot formation and destruction does not only play an important role in the design, but also essential in the operation of a turbulent combustion process. However, selection of appropriate soot model is of paramount importance for better providing prediction of soot release from a combustion system. This paper presents results obtained from the application of a computational fluid dynamics (CFD) approach to modelling of non-premixed turbulent ethylene sooting flame. The study focuses on comparing the two soot models available in the CFD Code Fluent in predicting the soot level in the turbulent non-premixed ethylene flame. A standard k-ε model and Eddy Dissipation model are utilized for the representation of flow field and combustion of the flame being investigated, respectively. For performance comparison study, a Tesner soot and Moss and Brookes soot models are tested. The results of calculations are compared with experimental data for a turbulent sooting flame taken from literature. The results of the study show that a combination of the standard k-ε turbulence model and eddy dissipation model is capable of producing reasonable predictions of temperature both in axial and radial profiles; although further downstream of the flame over-predicted temperatures are evident. With regard to soot model performance study, it shows that the Moss and Brookes model clearly performed far better than the Tesner's model in predicting the soot level in ethylene flame at both axial and radial profiles.

Keywords: Soot, Moss and Brookes Model, Tesner model, turbulent, ethylene

SPECIAL CURVES ACCORDING TO BISHOP FRAME IN MINKOWSKI 3-SPACE

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Abstract

In Minkowski 3-space, pseudo null curve is known as the curve whose frenet frame contains two null (lightlike) vector fields.

The concept of slant helix defined by Izumiya and Takeuchi [7] based on the property that the principal normal lines of an α curve (with non-vanishing curvature) make a constant angle with a fixed direction of the ambient space.

In this paper, we study helices, slant helices and AW(k)-type curves for pseudo null curve in Minkowski 3-space.

Keywords: Bishop frame, Pseudo null curve, slant helices.

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SpO2 Auto Scoring by Using Machine Learning Methods

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Abstract

In this study, it is aimed to investigate the relationship between Saturation of Peripheral Oxygen (SpO2) signal and other Polysomnography (PSG) signals through machine learning (ML) algorithms and digital signal processing methods. In other words, it is done to see how much accuracy can be made to automatically mark the SpO2 value using signals from all PSG channels (without SpO2 Signal).

PSG data used in the study is taken from a real patient. The patient is diagnosed as periodic limb movement disorder and a night PSG test is performed for diagnosis. Data obtained from this PSG test using the full PSG techniques at the Trakya University Medical Faculty Sleep Laboratory is recorded with 44-channel polygraph (Compumedics 44E series, Australia), and archived. The noisy data contained in these archived records is marked manually and not included in the analysis as this would have a negative effect on the accuracy of the ML algorithms.

PSGMiner software developed for ML was used for feature extraction. After the features were obtained, the selection of the features that would most contribute to the accuracy of the classification process with the ML algorithms was performed. Feature selection (Evaluator: InfoGain, Search method: Sorter) made for all available channels and features in the PSGMiner software.

The properties is classified using 3 different classification algorithms. The classification accuracy values in the study is calculated as; Artificial Neural Network (Multilayer Perceptron), K-Nearest Neighbor and Decision Trees (J48 truncated tree) are within acceptable limits. The results of the study showed that the SpO2 value can be automatically marked with a 71% accuracy rate using signals from all PSG channels (without SpO2 Signal).

Keywords: Machine Learning, PSG, medical informatic, digital signal processing

STABILITY ANALYSIS AND SYNCHRONIZATION OF A NEW 3D DYNAMICAL SYSTEM WITH NONSINGULAR KERNEL DERIVATIVE

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Abstract

In this work, we study a new fractional-order chaotic model where the derivatives are taken in Caputo-Fabrizio sense, and we investigate its synchronization to an identical system, via a linear control method , using the Laplace transform to get the analytical conditions, which guaranty the synchronization. Moreover, numerical simulations are presented to show the agreement between theoretical results and numerical solutions.

Keywords: Caputo-Fabrizio derivative, Chaos control, Stability, Numerical scheme.

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STOCHASTIC GENERAL PREINVEXITY FOR MULTIDIMENSIONAL PROCESSES AND ITS APPLICATIONS TO HADAMARD'S INEQUALITY

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Abstract

In this study, we identified initially general preinvex stochastic processes on real number set, immediately afterwards we defined general preinvex stochastic processes on the coordinates. Correspondingly, we also established multidimensional general preinvex stochastic processes which are a significant class of stochastic processes for optimization. Finally, we obtained Hermite-Hadamard type inequalities for all of the above mentioned processes using mean-square integrability.

Keywords: General preinvexity, multidimensional stochastic process, mean-square integrability, Hermite-Hadamard tye inequality

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STRATEGY USE OF MIDDLE SCHOOL 8th GRADE STUDENTS IN FRACTION MAGNITUDE COMPARISON

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Abstract

The studies in the literature showed that students had difficulty in fraction comparison [1, 2]. These problems mostly arise the fact that students memorize the rules rather than making sense. This study aimed to determine the strategies used by the students in fraction magnitude comparison. This study is based on descriptive analysis, which is a qualitative research method and was conducted with the students studying in 8th grade of the middle school. Six open-ended questions were used as data collection tool. The questions consisted of fractions whose shares were equal and equal to the denominators and the students were asked to compare these fraction magnitude. The share and denominators which is not equal were respectively given as natural numbers, decimal numbers and variables and the strategies used in fraction magnitude comparison were determined. The strategies used by the students were found to be in the form of rules, substitution, division, pieces, drawing, and algebraic cross-multiplication.

Keywords: fraction, sorting, secondary school students

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Sturm Liouville Problem with Discontinuous Symmetric Coefficient in Boundary Value Conditions

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Abstract

In this study, we discussed the problem of Sturm Liouville with discontinuous symmetric coefficients. The singularity theorem was proved for this problem. The inverse problem is solved. In addition, the eigenvalue and boundary conditions of a similar problem were used to find the coefficients of the problem.

Keywords: Sturm Liouville problem, discontinuities, symmetric, eigenvalue, boundary conditions.

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Sturm Liouville Problem with Discontinuous Symmetric Coefficient in Boundary Value Conditions

SYSTEM ANALYSIS OF HIV INFECTION MODEL WITH CD4^{+}T UNDER NON-SINGULAR KERNEL DERIVATIVE

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Abstract

Infectious diseases have caused the death of many people throughout the world for centuries. For this purpose, many researchers have investigated these diseases for establishing new treatment and protective measures. The most important of these is HIV disease. In this study, an HIV infection model of CD4^{+}T is handled comprehensively with the newly defined Atangana-Baleanu (AB) fractional derivative. The existence and uniqueness of the solutions for fractionalized HIV disease model with the new derivative by considering the Arzela-Ascoli theorem.

Acknowledgements: This work is financially supported by Balikesir University under the Grant no. BAP 2018 /013.

Keywords: Atangana-Baleanu (AB) derivative, HIV infection model, Arzela-Ascoli theorem, existence and uniqueness.

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THE EXACT SOLUTIONS OF CONFORMABLE FRACTIONAL PARTIAL DIFFERENTIAL EQUATIONS USING NEW SUB EQUATIN METHOD

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Abstract

In this article, authors employed the new sub equation method to obtain the new traveling wave solutions of conformable time fractional partial differential equations. Conformable fractional derivative is a well behaved, applicable and understandable definition of arbitrary order derivation. Also this derivative obeys the basic properties that Newtonian concept satisfies.

Keywords: Conformable Fractional Derivative, The new sub-equation method, Exact Solutions.

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The Fekete-Szegő Problem for Subclasses of analytic functions associated with Touchard Polynomials

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Abstract

Using the integral operator introduced by the auther [1] a new subclasses of analytic functions are introduced . For these classes, several Fekete-Szegő type coefficient inequalities are obtained.

Keywords: Integral operator, Touchard polynomials, Fekete-Szegő inequalities, Analytic functions.

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THE FOCAL CURVES ACCORDING TO MODIFIED FRAME IN MINKOWSKI 3-SPACE

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Abstract

In this paper, we obtain a new characterization of focal curves with respect to modified orthogonal frame in Minkowski 3-space. Finally, the correlation between the focal curvatures and the radius of the osculating sphere of time-like and space-like curves is given.

Keywords: Modified orthogonal frame, Minkowski space, focal curve.

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THE IMPACT OF DEVELOPING VISUAL BASIC ALGORITHMS ON STUDENT ACHIEVEMENTS IN TRIGONOMETRY

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Abstract

Visual Basic is one of the visual programming languages that were developed with the popularization of Windows operating system. Beyond the development and running a software, visual basic could be defined as a software development platform due to its plethora of tools for software development and advanced features such as ability to design the user interface, debugging, creating databases and to develop different types of software. Algorithm can be defined as step-by-step description of a method to solve a specific problem. Certain difficulties are experienced in learning the unit circle and trigonometric ratios, which are among the basic components of trigonometry. In order to eliminate these difficulties, a visual basic algorithm was developed to provide visualization and conceptual learning in the present study. The algorithm was developed by the authors, including one computer specialist. In this algorithm, an angle that continuously rotates 360 degrees on the unit circle. This algorithm was initially demonstrated to randomly selected 42 students in mathematics laboratory for two months (4 classes per week). The achievement test was applied before and after the application (2009). Data analysis and the open-ended questions posed to the students demonstrated that the students comprehended the topic of trigonometric ratios better and the application was effective on comprehension and visualization of programming language topics.

Keywords: Trigonometry, visual basic, algorithm development, achievement.

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THE NONHOMOGENEOUS FUZZY PROBLEM WITH THE EIGENVALUE PARAMETER IN THE BOUNDARY CONDITION

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Abstract

In this paper is studied the nonhomogeneous fuzzy problem with the eigenvalue parameter in the boundary condition. Solutions is found by using the Green's function.

Keywords: Fuzzy differential equation, Fuzzy boundary value problem, Hukuhara differentiability.

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THE PERTURBED TRAPEZOID INEQUALITIES FOR n-TIMES DIFFERENTIABLE s-LOGARITHMICALLY CONVEX FUNCTIONS

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Abstract

In this study, we introduce the perturbed trapezoid type inequalities for the functions whose n. th derivatives of absolute values are s-logarithmically convex. Besides, some results related to these inequalities are presented.

Keywords: Convex function, s-logarithmically convex, perturbed trapezoid inequalities.

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THE RELATIONSHIP BETWEEN R & D EXPENDITURES AND HIGH TECHNOLOGY PRODUCT EXPORT THE CASE OF TURKEY (1990-2017)

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Abstract

In the essence of differences in income differences and development levels between world states, it was accepted that the state had the technology, natural resources and economic stability. Sustainable economic stability is very important for countries. The importance of high technology product exports is an undeniable fact, especially in terms of economic development of developing countries. High-tech exports have recently been recognized as one of the most important factors in economic growth due to the high added value they contain. For this reason, R & D (research and development) expenditures are a very important factor in terms of achieving sustainable economic growth. R & D expenditures not only make it easier to reach higher standards in technology, but also lead to higher income levels and lead to development. Because of the differences in economic development among countries, governments increase the resources they allocate for education and enter into economic cooperation with other countries. They provide incentives for R & D investments of the public and private sectors and they are in search of new resources. In the economic sense, it is being investigated whether the R & D expenditures have an impact on the export of high technology products. In recent research, it is claimed that there is a causality between R & D spending and high technology product exports. Made the purpose of this study, R & D expenditures in Turkey and examine the causal relationship between exports of high-tech products. In the first study, expenditures for R & D and high-tech products export is dealt with institutional and conceptual framework, then also touched upon Turkey to do the innovation and R & D expenditures for. As part of this objective, R & D spending and exports high-tech products to Turkey between the years 1990-2017 data were obtained from the World data bank official page. Granger causality test was used to analyze the relationship between the data obtained.

Keywords: R & D, High Technology Products, Export

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THE SOLUTION BY VARIATIONAL METHOD OF AN INVERSE PROBLEM FOR NONLINEAR SCHRODINGER EQUATION

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Abstract

In the paper, we consider an inverse problem of determining the unknown coefficient and functions under an additional condition for a nonlinear Schrödinger equation with a special gradient term. The variational formulation of considered inverse problem is given. By using the variational formulation, the existence and uniqueness of the solutions of variational problem is shown. Also, the differentiability of the functional is proved and a necessary condition in variational inequality form for the solution of the variational problem is obtained.

Keywords: Nonlinear Schrödinger Equation, Variational Problem, Inverse Problem

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UNIFORM CONVERGENCE OF FINITE DIFFERENCE SCHEMES FOR A SINGULARLY PERTURBED CONVECTION-DIFFUSION PROBLEM WITH INTEGRAL BOUNDARY CONDITION

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Abstract

The aim of this paper is to give a uniform convergence numerical method for solving singularly perturbed nonlocal boundary value problem. The method is constructed by the method of integral identities with the use of exponential basis functions and interpolating quadrature rules with weight and remainder term in integral form. The numerical approximate on a uniform is proved first-order uniformly convergent in the discrete maximum norm, independently of the perturbation parameter ε. Furthermore, numerical results supporting the theoretical analysis are presented.

Keywords: Singular perturbation, Integral boundary condition, Uniform mesh, Finite difference scheme, Uniform convergence.

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Use of waste concrete in the transportation sector by recycling

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Abstract

The increase in the population and the urbanization rate, which is similar to the population growth rate, causes the use of exhaustion resources. The exhaustion of resources leads people to new searches. Undoubtedly, recycling is of great importance in these searches. Recycling is preferred as a method in the construction sector in all areas. In this study, the usability of the aggregate in the concrete was investigated. In order to use the waste concretes as a substructure material for road construction, they are disintegrated first in crushing machines and then they are separated by magnets from foreign materials such as iron. In addition, iron wastes collected through magnets are used in different areas after being melted and shaped. In this study, the usage of aggregates in waste concrete by means of recycling in transportation sector has been investigated and cost research has been done.

Keywords: Recycling, transportation, aggregate, substructure material

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Using genetic algorithms for parameter estimation of a two-component circular mixture model

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Abstract

In many environmental and biological applications, the data sets such as wave direction, orientations of animal are circular. This type of data is usually named as circular data and cannot be analyzed using linear statistical methods. The most common distributions for analyzing circular data are the von Mises (vM) and wrapped Cauchy (wC) distributions. In the present work, we consider a two-component circular mixture model of the vM and wC distributions. In order to obtain the maximum likelihood estimators of the parameters of the circular mixture model, we consider four optimization methods as the proposed genetic algorithms (GAs), Newton-Raphson, Nelder-Mead and simulated annealing. Here, GAs are a class of evolutionary algorithms and based on the principles of biological systems. The search space of the circular mixture model for GAs is also addressed. To compare the performance of four optimization methods, we provide the simulation and real data examples. The results indicate that the proposed GA seems to perform well in terms of parameter estimations as seen in simulated and real data examples.

Keywords: Circular data, Mixture model, Genetic algorithms.

VIRTUAL PRODUCT DESIGN FOR BALANCING OF TWO-SIDED MIXED MODEL ASSEMBLY LINES CONNECTED TO PRODUCE MULTI-LAYERED PRODUCTS

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Abstract

The assembly lines are being balanced in order to increase production speed, to reduce resource waste and loss of work power to the minimum level, to produce a large number of products in a more rapid and cost-effective manner, to improve working conditions and to create a working environment suitable to the physiological and psychological characteristics of employees. With today's changing and diverse customer demands, assembly line balancing has become a very important issue. Mixed-model assembly lines have recently become a working theme, especially since they are getting smaller quantities of mass production, with greater product variety and a growing trend for a shorter life cycle. In addition, two-sided assembly lines, designed for the production of large-scale products such as buses, trucks, tractors and industrial refrigerators, have now become the subject of study. Line efficiency is low due to the difference of model structures in the production line which is currently being worked. Due to the folded structure of the products produced, they are transformed into virtual assembly data. In this way, a more efficient line balancing opportunity was obtained. The aim of this study is to create a mathematical model for the virtual product design which will form the basis of two-sided mixed model assembly line balancing problem and the results are presented.

Keywords: Two-Sided Mixed Model Assembly Line, Multi-Layered Product, Line Balancing, Mathematical Model

Volatility Measurement of the Energy Price Using Different Entropy Methods

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In this paper, we show that the application of different entropy methods for world indices. To do this, we use energy prices in the world. We perform the notion of entropy for volatility measure to make a comparison. We calculate, Shannon entropy, Tsallis entropy, Rényi entropy and the approximate entropy. We supply numerical results for data set.

Key words: Shannon Entropy, Tsallis entropy, Rényi entropy, Approximate entropy.

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WEIGHTED STATISTICAL CONVERGENCE in PARANORMED SPACES

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Abstract

The main purpose of this work is to introduce and examine the concept of weighted statistical convergence in paranormed spaces and give the realtions between statistical convergence and weighted statistical convergence in paranormed spaces.

Keywords: Statistical convergence, Paranormed spaces

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Solitons, stability analysis and conservation laws for Kudryashov-Sinelshchikov equation

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Abstract

This study investigate the soliton solutions, stability analysis and conservation laws (Cls) for the Kudryashov-Sinelshchikov (KS) equation. The Riccati-Bernoulli (RB) sub-ODE method is used to obtain some soliton solutions with trigonmetric, hyperbolic and algebraic structures. The aspects of stability analysis for KS equation is investigated using the linear stability technique. We obtain Cls for KS equation by using the obtained point symmetry.

Keywords: KS equation, RB sub-ODE method, soliton solutions, conservation laws.

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Analytical and Approximate Solution of Two-Dimensional Convection-Diffusion Equations

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Abstract

In this work, we have used reduced differential transform method (RDTM) to compute an approximate solution of the Two-Dimensional Convection-Diffusion equations (TDCDE). This method provides the solution quickly in the form of a convergent series. Also, by using RDTM the approximate solution of two-dimensional convection-diffusion equation is obtained. Further, we have computed exact solution of non-homogeneous CDE by using the same method. To the best of my knowledge, the research work carried out in the present paper has not been done, and is new. Examples are provided to support our work.

Keywords: Reduced differential transform method (RDTM), nonhomogeneous convection-diffusion equation, two-dimensional convection-diffusion equation.

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3D METHOD AND CODES FOR SIMULATION FSI PROBLEMS IN EULER VARIABLES USING MULTI MESH ALGORITHMS BASED ON HIGH ORDER GODUNOV METHOD FOR CFD AND CSD

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Abstract

To model both the dynamics of media and deformable solids, the Godunov scheme of high-order accuracy in Euler-Lagrange variables is used, which is the same for both the Euler equations and the Euler-Cauchy equations describing the deformation of solids. The improving of the accuracy of the scheme is achieved by using the 3D and time-dependent Riemann's solver. The same solution is used to calculate the interaction between the fluids and the solids (FSI problem). In the calculation process, three types of difference grids are used. The first is a mobile surface grid in the form of a continuous set of triangles (STL file), which defines and accompanies the computational bodies and two kinds of three-dimensional 3D grids. This is the basic Cartesian fixed grid embeded in each body, and the movable local Euler-Lagrangian grid associated with the surface grid, which also accompanies the contact boundaries. The physical quantities in these grids are connected by mutual interpolation. A detailed description of the procedure was given in [1]. The codes does not require complex 3D mesh generators, only the surfaces of the calculating objects as the STL files, whichmakes it convenient to use by the user or even directly by the designer at the design stage. The method and codes are used to simulate shock wave and explosive loading and deep penetration problems of FSI.The processes of propagation of detonation waves from the initiation zones of explosives and the deforming of bodies on contact forces and the interaction process are taken into account. Three-dimensional processes of interaction of detonations with elastic plastic bodies located near the charges are considered. The bodies (cylinders, cubes, tetrahedrons) are strongly and irreversibly deformed, the streams of detonation products move much faster, and gas jets are formed around the cubes. The strong influence of geometry and density of the bodies is demonstrated.Three-dimensional processes of deep penetration of solid to solid and solid to fluid of cylinder impactors are simulated. The strong influence of the angle and velocity of penetration is demonstrated.

Keywords:Godunov type method, Riemann's solver, fluid structureinteraction

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ON THE ALMOST PERIODIC SOLUTIONS OF HIGH-ORDER FUZZY CELLULAR NEURAL NETWORKS WITH TIME-VARYING DELAYS

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Abstract

In this paper, almost periodic solutions are considered for a class of high-order fuzzy cellular neural networks with time-varying delays. By using properties of almost periodic functions, exponential dichotomy theory and some differential inequality techniques, some sufficient conditions are established to ensure for existence and exponential stability of solutions for the model. This results are new and complement recently ones. Finally, an example is given to show the correctness.

Keywords: Almost periodic solution, Fuzzy cellular neural networks, dichotomy, exponentialstability.

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Solitary waves for time-fractional Boiti-Leon-Pempinelli system

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Abstract

This talk is focused on the derivation of some new solitary wave to (2 + 1)-dimensional fractional Boiti-Leon Pempinelli system with time-conformable derivative via the analytical sinh-Gordon expansion technique based on the sinh-Gordon equation. The obtained solutions have different forms such as trigonometric, complex and hyperbolic function solutions. This powerful and simple technique can be used to investigate solutions of other fractional nonlinear partial differential arising in science and engineering.

Keywords: Fractional Boiti-Leon-Pempinelli system, sinh-Gordon expansion method, fractional conformable derivative.

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ALPHA POWER INVERTED KUMARASWAMY DISTRIBUTION: PROPERTIES AND APPLICATION

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Abstract

In this study, Alpha Power Inverted Kumaraswamy (APIK) distribution is defined by using alpha power transformation (APT) method introduced by Mahdavi and Kundu (2017); see AL-Fattah et al. (2017) for further information about the Inverted Kumaraswamy distribution. APT method has been used by many authors to obtain a new distribution; see for example Nassar et al. (2017), Unal et al. (2018), Ramadan and Magday A. (2018). Some statistical properties of the APIK distribution are derived. Maximum likelihood estimators of the unknown parameters of the APIK distribution are obtained. At the end of the study, a real data set is modeled by using the APIK distribution and its modeling performance is also compared to some well-known distributions.

Keywords: *Inverted Kumaraswamy distribution, Alpha power transformation, Maximum likelihood*

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COMPARISON OF FLYWHEEL AND LI-ION BATTERY ENERGY STORAGE SYSTEMS AND PERFORMANCE ANALYSIS OF HYBRID ENERGY STORAGE SYSTEM ON DIFFERENT LOAD PROFILES

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Abstract

Nowadays, energy storage systems have gained importance with the ability to store energy during off-peak hours and to provide energy at peak hours in order to ensure energy reliability and sustainable energy use. However, existing energy storage systems have difficulties in storing energy due to various issues such as charge / discharge, power density, energy density, response time, cost, life cycle. For this reason, hybrid energy storage systems are used to ensure the reliability and continuity of energy. In this study, technical properties of flywheel and li-ion battery energy storage systems are investigated. Response times, cost, power density, energy density are compared. These two energy storage systems are envisaged as a feasible structure because they offer an energy storage system with different response times, discharge times, power and energy densities with a longer and faster response time. These two systems and hybrid system are analyzed separately by analyzing their performance and system costs on two different loads based on electronic and electromechanics.

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Keywords: Energy storage systems; Flywheel; Li-ion battery

- **REFERENCES**

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The Solution of Differential Equations via Collocation Method Based on Bessel Polynomials

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Abstract

In this paper, A collocationmethod and Bessel Polynomials are used to get solution of differentialequations.Themethodbymeans of Besselcollocationpoints, transformsthedifferentialequationto a matrixequationwhichcorrespondsto a system of nonlinearalgebraicequationswithunknownBesselcoefficients. Thesolutions in the form of powerseriesareobtained. Methodareapplied on test problems. Results demonstrate in tables that they are quite applicable. All of thenumericalcomputationshavebeencomputed on computerusing a codewritten in Matlab.

Keywords: DifferentialEquations, BesselPolynomials, BesselCollocationMethod.

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THE ENVIRONMENTAL EFFECT OF FINANCIAL DEVELOPMENT BASED ON THE HUMAN DEVELOPMENT İNDEX

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Abstract

Many studies have examined the relationship between environmental degradation and economic growth, but there are no studies examining the relationship between environmental degradation, human development, and financial development. The environmental impact of financial development has been studied by some countries and OECD countries but this issue has not been examined in terms of the level of development of the countries. The aim of this paper is to assess the environmental impact of financial development according to the level of human development of countries.

In this study, we have considered fifty-nine developed countries (very high) and fifty-two fast developed countries (high) for the period 2001 and 2018 use GMM model that environmental impact of financial development in OECD countries from 2001 to 2012. In this study, we have implemented generalized method of moments (GMM) approach because it is a dynamic model which is allowed to control the endogeneity problem, heteroskedasticity, Nickell bias and simultaneous reverse causality with reference to other techniques.

Keywords: Financial Development, Human Development, Carbon emissions, Environmental sustainability .

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ON BASIS PROPERTY FOR A CLASS SECOND ORDER DIFFERENTIAL OPERATOR

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Abstract

We consider a class of Sturm-Liouville problem with eigenparameter-dependent boundary condition

$$\ell(y) \equiv -u'' + q(x)u = \lambda\omega(x)u, \tag{1}$$

on $[-1,0)$ and $(0,1]$ with the boundary conditions

$$u(-1) + hu'(-1) = 0, \tag{2}$$

$$(\beta_1 u(1) - \beta_2 u'(1)) + \lambda(\tilde{\beta}_1 u(1) - \tilde{\beta}_2 u'(1)) = 0, \tag{3}$$

and the transmission conditions

$$\gamma_2 u'(-0) - \delta_2 u'(+0) = 0, \tag{4}$$

$$\gamma_1 u(-0) - \delta_1 u(+0) = 0, \tag{5}$$

where $\omega(x)$ is piecewise continuous function, $q(x)$ is real valued function continuous in $[-1,0)\cup(0,1]$ and has finite limits $q(\pm 0) = \lim_{x\to\pm 0} q(x)$, λ is a complex parameter, $h, \beta_i, \tilde{\beta}_j, \gamma_k, \delta_l$ $(i,j,k,l = 1,2)$ are arbitrary real numbers.

In this work we investigate the completeness,minimality and basis properties of the eigenfunctions of one class discontinuous Sturm-Liouville equation with a spectral parameter in boundary and transmission conditions.

Keywords: Basis property, eigenfunctions, Sturm-Liouville operator.

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THE INVERSE PROBLEM OF SCATTERING FOR A BOUNDARY VALUE PROBLEM

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Abstract

We consider the Sturm-Liouville equation on the semi-axis

$$-y'' + q(x)y = \lambda^2 y \qquad (0 \le x < \infty) \tag{1}$$

with the spectral parameter in the boundary condition

$$\frac{y'(0)}{y(0)} = p(\lambda) \tag{2}$$

where λ is a complex spectral parameter, $p(\lambda)$ is a polynomial and $q(x)$ is the real-valued integrable function.

In this paper, we study the inverse problem of scattering theory for the boundary problem (1)-(2). The scattering data for this boundary-value problem is defined, the properties of the scattering data are examined and the main equation which has important role in the solution of the inverse problem is obtained.

Keywords: Sturm – Liouville operator, inverse problem, scattering data.

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Analysis of a Fractional Differential Equation with Riesz-Caputo Derivative: Comparison Principles and Applications

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Abstract

In this paper, we study linear and nonlinear fractional differential equations with the Riesz-Caputo derivative of order $0 < \alpha < 1$. At first, we estimate the fractional derivative of a function at its extreme points, and apply the result to obtain a new comparison principle for a homogenous linear fractional equation. We then, use the obtained comparison principle to analyze the solutions of the associated linear and nonlinear fractional differential equations. For the linear equation, we derive a norm estimate of the solution and obtain a necessary condition to guarantee the existence of a solution. For the nonlinear equation, we derive a uniqueness result and obtain several comparison results. At the end, we present several examples to illustrate the efficiency of the obtained results.
Key words and phrases: Fractional differential equations, Maximum principle, Riesz-Caputo derivatives.

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THE ROLE OF COMPUTATIONAL MATEHEMATICS IN CONSTRUCTION INDUSTRY

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Abstract

Computational mathematics based on numerical methods has become one of the most important part of engineering due to developments of technology. More complex products are being manufactured by the help of modelling, simulation and other innovative computational approaches. Construction industry is undoubtedly very important for many countries since it is a driving sector affecting hundreds of other sectors directly or indirectly. Technologic developments have also changed the ability of designers and constructors considerably in recent years. In this study, the role of computational mathematics in construction industry has been discussed by analyzing different sources and case studies. In addition, interviews have been held with a variety of experts in order to determine real benefits. As a result of study, it has been observed that computational mathematics has become much more important compared to the past, although usage of computational mathematics in civil engineering is not new for the sector. The study has also shown that building information modelling, virtual reality and other new concepts have appeared in the sector and now facilitating many complex structures. Structural analyzes and simulations are more strong now thanks to the finite element tools. Genetic algorithms and fuzzy logic systems are also making considerable contributions to the sector. It can be easily said that computational mathematics will be more helpful not only for construction sector but also other industries.

Keywords: Computational Mathematics, Construction Industry, Civil Engineering, Numerical Methods

Distributed Order Diffusion on Financial Networks

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Abstract

Fractional differential equations have attracted lots of attention in various scientific researches due to their importance in explaining natural phenomenon. In particular, it is shown that the economic processes involve strong memory effect. In financial complex networks like stock market networks, foreign exchange rates network, inter-banking relation networks, hedge funds networks, there may emerge an economic crisis or stress. In the neo-liberal economic theoretical approaches, such crises or stress are assumed to spread rapidly. Generally speaking, financial agents' involvement in a crisis can be affected by internal or external factors. The internal factor is up to agent's financial vulnerability to the economic crisis whereas the external factor depends on the vulnerability of the neighboring agents. Accordingly, we propose a diffusion model with distributed order fractional derivatives as

$$\mathcal{D}_0^{[0,1]} x_i(t) = D_i \sum_{j=1}^{n} a_{ij}(x_j - x_i),$$

where a_{ij} is the element of the adjacency matrix of a network represented by simple undirected graph $G = (V, E)$ with $|V| = n$. We also give a numerical solution to such equation by finite differences and analyze it on a real world model of foreign exchange rates networks throughout the 2008 global economic crisis.

Keywords: Financial Networks, Diffusion Process, Distributed Order Fractional Derivatives

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Area Vectors of Lorentz Spherical Curves and its Application

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Abstract

In this study, the field vectors of the closed Lorentz spherical curves are given by using the unit time-like Steiner vector, which is a different method. The field formulas were used to obtain the correspondence of [1].

Keywords; 1-parametered closed spherical motion, Closed Lorentz Spherical Curves, Time-like Steiner vector, The space of lorentz spherical area.

MSC: 53A35; 53B30; 53C50

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Simplification Method for Point Clouds Using Local Entropy of Gaussian Curvatures

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Abstract

Development of the modern 3D measurement technologies let us to capture dense point cloud datasets easily. In order to resolve the problem of pruning and quickly reconfiguring unnecessary points, simplification for the point cloud is a necessary step during the process. In this paper, we present a new simplification method for point clouds. In the presented method, the kernel procedure is to evaluate the importance of points based on local entropy of Gaussian curvature. This Gaussian curvature is obtained by the triangular mesh of k-nearest neighborhood of the point. Then, the least important points are removed and Gaussian curvatures are updated until user-specified reduction rate is reached. Besides, an indicator is determined by the mean entropy of the simplified point cloud in order to evaluate the accuracy of the results. Moreover, the performance of the method is illustrated with three point cloud examples.

Keywords: Point Cloud Simplification, Gaussian Curvatures, Local Entropy

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A Numerical Solution of System Characterizing Curves of Constant Breadth

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Abstract

Frenet-like differential equations are mainly used in kinematics and geometric optics. In this study, we first present integral characterizations of such equations. Then, by using finite difference methods, we obtain the set of solution of Frenet-like differential equation that characterize curves of constant breadth arising in geometric optics.

Keywords: Frenet-like Differential Equations, Curves of Constant Breadth, Finite Difference Method

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THE SOLVABILITY OF FIRST TYPE BOUNDARY VALUE PROBLEM FOR A SCHRODINGER EQUATION

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Abstract

The paper present an first type boundary value problem for Schrödinger equation with a special gradient term. The existence and uniqueness of solutions of the boundary value problem is shown by using Galerkin's method and is given a priori estimate for solution.

Keywords: Schrödinger equation, Galerkin's Method.

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Effect of pH Solutions on Using Waste Marble powder to Enhance Mortar Compressive Strength

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Abstract. The aim of this study is to improve the compressive strength of mortar by adding a recycled material (marble powder) at different weights gradually to the mortar. The samples were prepared and treated with different pH solutions to investigate how can effect compressive strength. The results showed that after preparing the sample of mortar by adding different weights of marble powder, the Compressive strength of the sample of (4 gm) weight of marble powder had the highest value comparing with other samples. The compressive strength for the samples were treated with different pH showed that it decreased with increasing acidity (pH from 1 to 6), but the other sample's compressive strength increased with increasing alkalinity (pH from 8 to 14). At (pH from 1 to 14), the compressive strength was increasing gradually.

Key Words. Mortar, Compressive Strength, Waste Marble Powder, pH solutions.

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