BOOK OF ABSTRACTS

6th INTERNATIONAL CONFERENCE ON COMPUTATIONAL MATHEMATICS AND ENGINEERING SCIENCES

20-22 May
2022, Ordu – Turkey

THE SIXTH INTERNATIONAL CONFERENCE ON COMPUTATIONAL MATHEMATICS AND ENGINEERING SCIENCES (CMES-2022), ORDU/TURKEY, MAY 20-22 2022

The **Sixth International Conference on Computational Mathematics and Engineering Sciences (CMES-2022)** will be held in Ordu University from **20- to 22 May 2022 in Ordu, 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 recent developments in these areas, and to share the computational experiences of our invited speakers and participants.

The Organizing Committee

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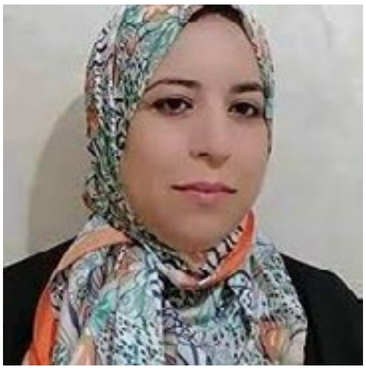


Dear Conference Attendees,

We are honored to welcome you to the **Sixth International Conference on Computational Mathematics and Engineering Sciences (CMES-2022)** at Ordu University from 20 to 22 May 2022 in Ordu City, Turkey.

CMES, founded in 2016 at Faculty of Science and Techniques Errachidia Moulay Ismail University Morocco is an annual intarnational conference, which was very successful in the past years by providing opportunities to the participants in sharing their knowledge and informations and promoting excellent networking among different international universities. This year, the conference includes 200 extended abstracts, several submissions were received in response to the call for papers, selected by the Program Committee. The program features keynote talks by distinguished speakers such as : **Alissandra Maria Ragusa** from Catania University Italy, **Dumitru Baleanu**, from Institute of Space Sciences, Magurele-Bucharest, Romania, **Juan-Luis García Guirao** from Technical University of Cartagena, Spain, **Oscar Castillo** from Tijuana Institute of Technology, Tijuana, Mexico, **Hossein Jafari** from UNISA South Africa, **Vatan Karakaya** from Ahi Evran University, Turkey, **Ekrem Savas** from Usak University, **Muhammad Reza Safaei** from Florida University USA, **Erhan Coşkun** from Karadeniz Technical University, Turkey and **Hüseyin Merdan** from Tobb University, Turkey. The conference also comprises contributed sessions, posters sessions and various 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-2022 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-2022 interesting and intellectually stimulating, and that you will enjoy meeting and interacting with researchers around the world.

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Applied Mathematics,
Financial Mathematics,
Control Theory,
Game Theory
Modeling of Bio-systems for Optimization and Control,
Linear and Nonlinear programming and Dynamics,
Artificial Intelligence,
Geometry and Its Applications,
Analysis and Its Applications,
Statistics and Its Applications,
Mathematics Education and Its Applications,
Algebra and Its Applications.
Engineering Sciences
Computer Science

Information technology
Electrical and Electronic Engineering
Ordinary, Partial, Stochastic and Delay Differential Equations
Chaos and Dynamical Systems
Numerical methods and scientific programming
Fractional Calculus and Applications,
Cryptography and its applications
Computational Fluids mechanics, Heat and Mass Transfers.
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Topology and Its Application
Education Sciences
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PLENARY & INVITED TALKS

The interaction of minimizers of functionals and Vanishing Mean Oscillation functions

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Abstract We show the advances on some regularity problems related to minimizers

$$u(x) : \Omega \rightarrow R^n$$

of some quadratic and non quadratic growth functionals. About the dependence on the variable x is of the integrand function A(x, u, p) of the functionals it belongs to the Vanishing Mean Oscillation class, as a function of x. Then, is pointed out that the continuity of A(x, u, p), with respect to x, is not assumed.

Keyword: Regularity, Minimizers of functionals, Vanishing Mean Oscillation functions.

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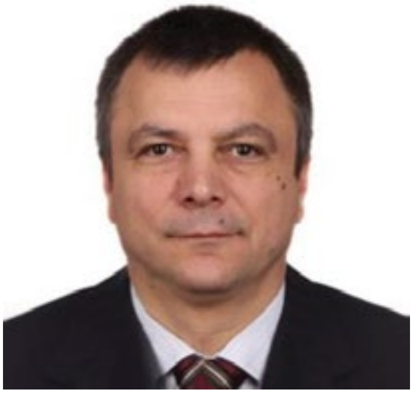

MODIFIED AND GENERALIZED FRACTIONAL OPERATORS: THEORY AND APPLICATIONS

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Abstract

It is wel known that the fractional calculus deals with the study of so-called fractional order integral and derivative operators over real or complex domains, and their applications.In my talk I will present some new trends in the field of modified and generalized fractional operators.Illustrative examples will be presented.

Keywords: fractional calculus, modified fractional operators, generalized fractional operators

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FIXED POINTS AND COUPLED FIXED POINTS IN B-METRIC SPACES VIA GRAPHICAL CONTRACTIONS

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Abstract

In this paper some existence and stability results for cyclic graphical contractions in complete metric spaces are given. Moreover, we discuss a vectorial case of our main result. Some applications to coupled fixed point problems are also derived.

Keywords: Existence and stability results for cyclic graphical contractions in complete metric spaces

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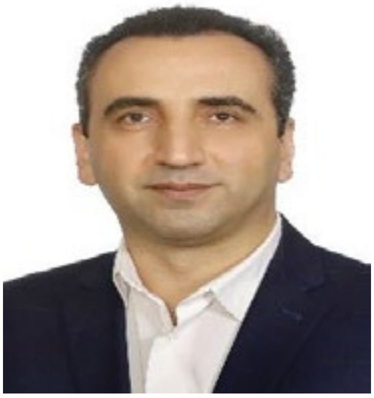

A COMPARISON ON SOME INTEGRAL TRANSFORMS

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Abstract

Integral transforms are important to solve real problems. Appropriate choice of integral transforms helps to convert differential equations as well as integral equations into terms of an algebraic equation that can be solved easily.

During last two decades many integral transforms in the class of Laplace transform are introduced such as Sumudu, Elzaki, Natural, Aboodh, Pourreza, Mohand, G_transform, Sawi and Kamal transforms.

In this work, we compare some integral transforms in the class of Laplace transform which are introduced during last few decades. After that we propose a general integral transforms which is covered all of those integral transforms. Also, we discuss about combanition of these integral transforms and decomposition methods.

Keywords: Integral transform; Decomposition methods; Iterative method.

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MATHEMATICAL METHODS IN INDUSTRIAL MATHEMATICS: A REVIEW FROM RECENT CASE STUDIES

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Abstract In this talk, we describe our experience of identification, mathematical formulation and handling of industrial problems posed by firms having active research and development units. We highlight common features of industrial problems from OECD report of industrial mathematics [1], describe basic mathematical tools and skills needed to engage in problems of industry and discuss some relevant case studies including the ones from the Euro-Asian Study Group with Industry[2] held in Trabzon, Turkey. Our aim is to convince young mathematicians that they can indeed develop their skills to tackle industrial problems, which will not only help industry to gain compatitive advantage but also lead to having original research areas that are more likely to be supported from private and government institutions.

Keywords: Industrial mathematics; mathematical modeling; study groups with industry.

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SHANNON–WHITTAKER–KOTEL'NIKOV'S THEOREM GENERALIZED

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Abstract The aim of the this talk provide a generalization of the classical Shannon-Whittaker-Katel'niko's theorem for a class of non band-limited signals which plays a central role in the signal theory, the Gaussian map is the unique function which reachs the minimum of the product of the temporal and frecuential width. This solves a conjecture stated by Boas in 1972.

Keywords: Shannon–Whittaker–Kotel'nikov's Theorem; recomposi- tion of chemical products, signal theory.

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COMPLEX DYNAMICS OF A RATIO-DEPENDENT POPULATION MODEL: STABILITY, BIFURCATIONS AND CHAOS

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Abstract Nonlinear dynamical behaviors of a prey-predator system with Leslie type will be presented. First, the stability analysis will be given. Second, the bifurcations and chaotic behavior of the model will be discussed. Finally, numerical simulations will be shown to support and extend the theoretical results. The results obtained will be interpreted from the biological point of view.

Keywords: Prey-predator model, stability analysis, bifurcations, chaotic behavior

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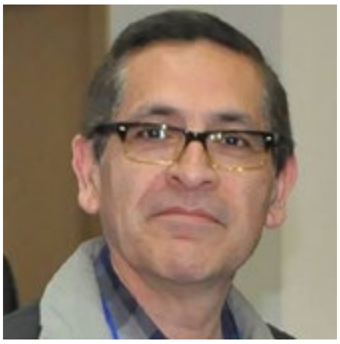

TYPE-2 FUZZY SYSTEMS AND FUTURE TRENDS FOR TYPE-3: THEORY AND APPLICATIONS

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Abstract: Type-2 fuzzy systems are powerful intelligent models based on the theory of fuzzy sets, originally proposed by Prof. Zadeh. Most real-world applications up to now are based on type-1 fuzzy systems, which are built based on the original (type-1) fuzzy sets that extend the concept of classical sets. Type-2 fuzzy sets extend type-1 fuzzy sets by allowing the membership to be fuzzy, in this way allowing a higher level of uncertainty management. Even with the current successful applications of type-1 fuzzy systems, now several papers have shown that type-2 is able to outperform type-1 in control, pattern recognition, manufacturing and other areas. The key challenge in dealing with type-2 fuzzy models is that their design has a higher level of complexity, and in this regard the use of bio-inspired optimization techniques is of great help in finding the optimal structure and parameters of the type-2 fuzzy systems for particular applications, like in control, robotics, manufacturing and others. Finally, the prospects for the future trends and applications of type-3 fuzzy logic will be discussed.

Keywords: Type-2 Fuzzy systems, Type-1 fuzzy systems, Fuzzy Logic.

AN EVALUATION ON THE RELATIONSHIP BETWEEN HUMANITY'S ADVENTURE OF KNOWLEDGE AND HIKMAH

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Abstract

The main purpose of this study is to investigate the knowledge and wisdom relationship based on the definitions of God and knowledge of certain civilizations within the context of written history. This relationship is tried to be explained under the definitions of God and knowledge derived from eminent thinkers of Ancient Greece, Islamic and Modern Western civilizations. The relationship between knowledge and wisdom in those two civilizations are examined with regard to the concept of 'hikmah' defined in Islamic civilization. After that, a general comparison was made on the topics of God and knowledge definitions of the founder thinkers of these three civilizations. As a result of this comparison, it has been concluded that the definitions of God and knowledge definitions of Ancient Greece and Modern Western civilizations are similar, and these two concepts do not match the content of 'hikmah'. Main reason behind this discrepancy is concluded as the unique conglomeration of tasawwuf, kalam and Aristotelian philosophy in Islamic civilization. In Islamic civilization, these three thought traditions assimilated the thought before them, formed their own tradition and laid the groundwork for the next civilization.

Keywords: Belief in God, definition of knowledge, knowledge and hikmah.

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A NEW SEQUENCE SPACE OF WEIGHT g

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Abstract. Recall that $f : [0,\infty) \to [0,\infty)$ is a modulus function if it satisfies the following properties.

i): $f(x) = 0$ if and only if $x = 0$,
ii): $f(x+y) \le f(x) + f(y)$,
iii): f is increasing,
iv): f is continuous from the right at 0.

In this paper, we define a new sequence space by using modulus function and also investigate some relations the spaces between $[\hat{V}^g, \lambda, f, t]$ and $\hat{S}^g_\lambda$ where $g : [0,\infty) \times [0,\infty) \to [0,\infty)$, $g((x_{nm}) \to \infty$ for any sequence (x_{nm}) in $[0,\infty) \times [0,\infty)$ with $x_{nm} \to \infty$.

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On Solutions Stochastic Nonlinear Partial Differential Equations with Conformable Derivatives

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Abstract

It is well known that stochastic nonlinear partial differential equations(NPDEs) is more complicated then deterministic equations because of the additional random terms. In this study, it is considered a stochastic Wick-type nonlinear partial differential equation with conformable derivatives [1]. It is obtained exact and stochastic solutions of this equation using the extended G'/G method, white noise theory and Hermit transforms [2]. Then it is given a special example and shown how these solutions presented as Brownian motion function solutions.

Keywords: Extended G'/G-method; stochastic wick-type NPDEs; white noise theory.

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A BRIEF SURVEY ON NUMERICAL SOLUTIONS OF SINGULARLY PERTURBED PROBLEMS

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Abstract

In this work, a brief survey on numerical solutions of singularly perturbed problems is given. In the present survey contained in this paper, we don't aim at an entire complete bibliographical survey. A literature review was conducted between 2010-2021. The list of references in this paper, includes a variety of publications of singularly perturbed differential and integro-differential equations.

Keywords: Singular perturbation, Ordinary differential equations, Integro-differential equations, Initial and boundary value problems, Uniform convergence, Boundary layers, Error estimate.

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$(\Delta^m_v)_u$ - GENERALIZED WEIGHTED STATISTICAL CONVERGENCE

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Abstract

In this study, we introduce and examine the concepts of $(\Delta^m_v)_u$ - generalized weighted statistical convergence and $(\Delta^m_v)_u$ - generalized weighted (N,t_{n})-summability. Furthermore we give some relations between $(\Delta^m_v)_u$ - generalized weighted statistical convergence and $(\Delta^m_v)_u$ - generalized weighted (N,t_n) - summability.

Keywords: Density, Cesàro summability, weighted statistical convergence, generalized difference sequence.

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HYERS-ULAM STABILITY OF QUANTUM LOGIC FUZZY IMPLICATION

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Abstract

In fuzzy logic we have four kinds of fuzzy implication which called (S, N)-Implications, R-Implications, QL-Implications, and D-Implication. Since there are many types of stability for various functional equations. In this research, we study Hyers-Ulam stability of functional equations with fuzzy implications for QL $-$implication.

Keywords: Fuzzy implication, QL $-$implication, Stability.

PρLog: A Language for Exact and Approximate Reasoning

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Abstract

PρLog is a rule-based system [2, 3], that extends Prolog with strategy conditional transformation rules. These rules (basic strategies) define transformation steps on finite (possible empty) sequences. Strategy combinators help to combine strategies into more complex ones in a declaratively clear way. Transformations are nondeterministic and may yield several results, which fits very well into the logic programming paradigm. Strategic rewriting separates term traversal control from transformation rules. This allows the basic transformation steps to be defined concisely. The separation of strategies and rules makes rules reusable in different transformations. Transformation rules are equipped with four different kinds of variables (individual, sequence, function, and context variables) together with regular constraints. These variables allows to traverse sequences in single/arbitrary width (with individual and sequence variables) and terms in single/arbitrary depth (with functional and context variables). Regular constraints are useful to restrict possible values of sequence and context variables by regular sequence expressions and regular tree (context) expressions, respectively. These features facilitate flexibility in matching, providing a possibility to extract an arbitrary subsequence from a sequence, or to extract subterms at arbitrary depth.These capabilities enable PρLog to have highly declarative programming style that is expressive enough to support concise implementations for: specifying and prototyping deductive systems, solvers for various equational theories, tools for XML querying and transformation, etc. Recently, we extended PρLog with fuzzy proximity relation to support uncertain computation [1]. In this talk we give an overview of the PρLog system and underline its new applications.

Keywords: Fuzzy Logic Programming, Fuzzy Prolog, Proximity and Similarity Relations

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SOME NEW SOLITON SOLUTIONS OF TIME FRACTIONAL RESONANT DAVEY-STEWARTSON EQUATIONS

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Abstract

In this study, via the Bernoulli sub-equation method (BS-EM), the traveling wave solution of the (2+1)-dimensional resonant Davey-Stewartson system is investigated. The nonlinear partial differential equation of the (2+1)-dimensional resonant Davey-Stewartson system is transformed into a nonlinear ordinary differential equation using a wave transformation, and then solved using the BS-EM approach. Some new solutions have been built successfully. The (2+1)-dimensional time-fractional resonant Davey-Stewartson equation is satisfied by all of the discovered solutions in this research. For all of the computations and graphic plottings in this investigation, we used Wolfram Mathematica 12 software.

Keywords: The Bernoulli sub-equation method (BS-EM), The Fractional Riemann-Liouville derivative, Resonant Davey-Stewartson equation.

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PERFORMANCES OF FITS WHEN SOME GROWTH MODELS ARE HYPERBOLIC

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Abstract

In this study, some growth models as well as their hyperbolic growth models were examined. In addition, the effect of these hyperbolic growth models on the selection of appropriate growth model was investigated by using some model selection criteria such as coefficient of determination and error sum of squares. Using data sets, the results of these hyperbolic growth models were found to be better than the results of these growth models.

Keywords: Hyperbolic; Growth Models; Monomolecular; Logistic; Gompertz

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The Consecutive Substitution Method for Boundary Value Problem with Retarded Argument

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Abstract

In this paper, we obtain the consecutive substitution method to problem for a differantial equation with retarded argument by this method, we obtain an integral equation that is equivalent to the boundary value problem. The equivalent integral equation is usually a Fredholm equation in the classicial theory. In this study we obtain a Fredholm- Volterra integral equation different from the classicial theory for the problem.

Keywords: Boundary value problem, Fredholm-Volterra integral equation,the consecutive substitution method.

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MATHEMATICS TEACHERS' VIEWS ABOUT THE TRANSITION FROM ONLINE TEACHING TO FACE-TO-FACE EDUCATION

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Abstract

This study aims to examine the problems experienced by mathematics teachers in the transition of students from distance and online education to face-to-face education. With the return to face-to-face education, some of the challenges, problems, and what can be done to overcome them are worth investigating. There are very few studies comparing online and face-to-face as teaching approaches for mathematics teaching. In a study, it is found that there exists no significant difference between online and face-to-face math teaching in terms of the impact on the academic achievements of sixth-graders [1]. The current research was carried out by case study method from qualitative research methods and five mathematics teachers with different levels and experience in a province in the Black Sea region of Turkey were selected as participants of the study with a purposeful sampling method. Semi-structured interviews were conducted with these teachers. The data obtained from the interview were examined and the codes from the related literature and the ones resulting from the research formed the categories. The findings demonstrated that students have some behavioral and educational adaptation problems. Teachers have expressed difficulties in complying with classroom rules, listening to lessons, and communicating as behavioral adaptation problems of students. In terms of education, the lack of subject matter knowledge from previous semesters, slowing down habits such as writing and taking notes, and decreased interest and attitudes towards mathematics courses were expressed. The teachers who participated in the study stated that they observed negative attitudes in students' behavior, such as apathy, prejudice development, timidity, and lack of self-confidence. In addition, the opinions and recommendations of teachers have been examined to address or improve these problems.

Keywords: Online Teaching; Face-to-face education; Mathematics teachers.

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SOLUTION OF (2+1)-DİMENSİONAL QUANTUM ZAKHAROV-KUZNETSOV EQUATİONS USİNG THE THE MODIFIED $\exp(-\Omega(\xi))$-expansion FUNCTION METHOD

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Abstract

In this paper, we obtain the (2+1)-dimensional quantum Zakharov-Kuznetsov equations are by using the the modified $\exp(-\Omega(\xi))$-expansion function approach. All the investigated solutions in this study have supported their corresponding model. Under the choice of suitable values of the parameters involved, the 2D and 3D graphs of the reported solutions are plotted.

Keywords: Expansion method, conformable derivative, Zakharov-Kuznetsov equation

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ABOUT NEW MATHEMATICAL APPROACHES IN FRACTIONAL BIOLOGICAL MODELLING

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Abstract

The subject of fractional calculus, as the calculus of integral and derivatives of arbitrary order, has gained popularity and importance, mainly due to its demonstrated applications in diverse fields of science and engineering (see [1-4] and references therein). This is due to the reason that these operators enable the description of the memory effect which naturally is involved in various complex processes. Hence, there is a growing need to study and use the fractional-order differential and integral equations for effective modelling of such complex phenomena.

In this study, some recent mathematical tools of fractional calculus will be presented for the mathematical modelling and anticipation of important complex biological phenomena, such as infectious diseases. The performances of new fractional operators are investigated on the considered biological models. Numerical simulations are performed with respect to the different values of the biological model parameters and order of the fractional operators.

Keywords: Complex systems; Fractional calculus; Numerical approximations.

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FIXED POINTS AND COUPLED FIXED POINTS IN B-METRIC SPACES VIA GRAPHICAL CONTRACTIONS

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Abstract. In this paper some existence and stability results for cyclic graphical contractions in complete metric spaces are given. Moreover, we discuss a vectorial case of our main result. Some applications to coupled fixed point problems are also derived.

Keywords: Fixed point, b-metric space, vector-valued b-metric space, coupled fixed point.

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SIMULATION OF A LIGHT-EMITTING DIODE BASED ON ORGANIC MATERIALS UNDER ATLAS-SILVACO

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Abstract

Organic light-emitting diodes (OLEDs) represent light sources capable of providing very high luminance. OLEDs have attracted a lot of attention because of their desirable characteristics including their low consumption of electrical energy, their flexibility... Regarding the structure, OLEDs are composed of an organic semiconductor layer sandwiched between two electrodes (at least one transparent) allowing the application of a DC voltage necessary for their functioning. The objective of our work consists on the one hand in determining the electronic and optical properties of an OLED based on the organic material having the structure P3-B-EDOT-B-T3-A [molecule composed of Phenylene (P), Thiophene (T), 3,4-Ethylenedioxythiophene (EDOT) and Benzothiadiazole (B)] using the simulation software TCAD-SILVACO "ATLAS", and on the other hand, it shows the effect of varying the thickness of the emitting layer and the doping concentration of charge carriers on these properties.

Keywords: Organic materiel, OLED, donor, DFT, I-V caracteristic.

NOVEL SOLUTION FOR DETERMINISTIC TYPHOID FEVER MODEL WITHIN THE FRAME OF FRACTIONAL ORDER

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Abstract

The main aim of the present investigation is to analyse mathematical model exemplifying typhoid fever illustrated in system of five ordinary differential equations using the fractional natural decomposition method (FNDM) with the Caputo fractional operator. The projected algorithm is amalgamation of Adomian decomposition technique and natural transform. For diverse fractional order, the behaviour of the outcomes is presented in terms of plots. The present study exemplifies the importance of fractional operator and efficiency of the projected algorithm. Finally, the present study may help to examine the wild class of real-world models and also aid to predict their behaviour with respect to parameters considered in the models.

Keywords: Typhoid fever; Caputo derivative; fractional natural decomposition method.

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The periodic wave solutions of conformable time-fractional mathematical model by analytical method

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Abstract

In this paper, the wave solutions of the time-fractional Zoomeron equation were get by the modified exponential function method (MEFM). When the solution functions found as a result of the calculations are analyzed, hyperbolic and trigonometric functions with periodic functions are also rational functions. Two-three-dimensional contour and density graphs representing the characteristic feature were drawn by determining the values according with the method in the parameters in the solution functions obtained.

Keywords: Conformable time-fractional Zoomeron equation; modified exponential function method; traveling wave solutions.

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ANALYSING ONE PREY AND TWO PREDATORS MATHEMATICAL MODEL WITH HOLLING TYPE II RESPONSE AND FADING MEMORY

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Abstract

Studying prey-predator interactions forms the basis of ecology as it helps to understand the dynamics of population models. In this presentation, we introduce one prey and two predators mathematical model with Holling type 2 response function. The aim of this study is to investigate this model by taking the role fading memory effect and competition into account on the dynamics. The fixed points and local stability analysis of the four-component model are investigated and the findings are supported with numerical simulations.

Keywords: Population interactions; Fading memory effect; Stability analysis.

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STRESS ANALYSIS OF MULTI-LAYERED SOIL MEDIUM BY USING FINITE AND INFINITE ELEMENTS

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Abstract

In this study, stress analysis of in two dimensional elastic, isotropic a semi-infinite layered soil medium is by using finite element method. The soil is modelled using finite-infinite elements. In the literature, more realistic results are obtained when using infinite elements for infinite media solutions compared to finite element solutions. For solving the problem, cubic finite elements with 16 nodes and infinite elements with 8 nodes are generated. The shape functions of the infinite elements are calculated separately for each direction. The region close to the soil surface is used with finite elements, and the region far from the soil surface is used with infinite elements. Finite-infinite elements are solved by Gauss Legendre integration method with five nodes. The numerical results obtained with the Boussinesq theory are compared and verified. A parametric study is performed using different layer thicknesses and different material properties in a semi-infinite soil medium. The numerical results and graphs obtained with MATLAB. The obtained results are compared.

Keywords: Stress analysis; Finite – infinite element method; Multi-layered soil.

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A NEW SPECIES RICHNESS MEASURE IMPROVED FROM MARGALEF AND MENHINICK

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Abstract

In the present study, a new estimator $\left({}^{\alpha^*}D_{MM}\right)$ is proposed to measure species richness. Its' essential inputs are alfa (α) scale parameters of Margalef (D_{MG}) and Menhinick (D_{MN}) indices.

To evaluate the performance of ${}^{\alpha^*}D_{MM}$, a hypothetical community dataset was used. The computations were performed using a spreadsheet program created for ${}^{\alpha^*}D_{MM}$. According to estimation results, ${}^{\alpha^*}D_{MM}$ seems to be a better form rather than D_{MG} and D_{MN}. Therefore it may be employed for comparing species richness of the natural communities. To better understand the performance of ${}^{\alpha^*}D_{MM}$, further studies should be however generated using various types of real ecological data.

Keywords: Alpha diversity, assemblage, biodiversity, diversity estimators, species richness

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WIGNER-VILLE DISTRIBUTION AND AMBUGUITY FUNCTION ASSOCIATED WITH QUATERNION OFFSET LINEAR CANONICAL

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Abstract

This work is devoted to the development of the Wigner-Ville transform (WVD) associated with quaternion offset linear canonical transform (QOLCT) theory proposed by Bhat and Dar in 2021 that has been designated as an emerging tool in the scenario of sig- nal processing as a detection of the linear frequency modulated signal. The purpose of this work is to introduce Wigner-Ville distribution(WVD) and Ambiguity function(AF) associ- ated with the quaternion offset linear canonical transform(WVD-QOLCT/AF-QOLCT). Firstly, we propose the definition of the WVD-QOLCT and then several important prop- erties such as dialation, nonlinearity, boundedness are derived. Secondly, we focus on the ambiguity function for the proposed transform. A bunch of important properties lincluding reconstruction formula associated with the ambiguity function are studied.

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Keywords: Quaternion algebra; Quaternion offset linear canonical transform; Wigner- Ville distribution; Ambugity function; Dalation

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Solitary wave solutions to a nonlinear mathematical model

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Abstract

The solitary wave solutions to a nonlinear mathematical model arising in mathematical physics are established in this study. To construct such novel solutions, we employ robust integration technique called modified Sardar method. The novel soliton control structure has been studied in order to explain specific physical problems. Three-dimensional and contour graphs have been plotted using suitable choice of the values of parameters involved.

Keywords: Nonlinear equation; Sardar method; Solitary waves.

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THE WIND LOAD CALCULATION OF A MASONRY MINARET BY USING DIN1056 STANDARD

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Abstract

Masonry minarets are the most special and specific structures for Islamic Culture that should be preserved to the next generations as they can carry the memories and the traces of the past generations. Even this is the case, there are so many outer factors that adversely affects the structural load carrying masonry system of these slender structures. The most dominant outer factors that adversely affect the load carrying system of masonry minarets are earthquakes and wind storms. Therefore, the effect of wind loads on these specific structures should be carefully investigated and determined. In this study, the wind loads for a masonry minaret is calculated by using DIN1056 standard and the details of procedure is provided explicitly.

Keywords: Wind load; Masonry; Minaret; DIN1056 standard

On the complex soliton solutions to the Hirota–Satsuma–Ito equation

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Abstract

In this work, we study the Hirota–Satsuma–Ito equation that describes the propagation of unidirectional shallow-water waves and interactions of two long waves with different dispersion forms. For this study, we use the sine-Gordon expansion method for the suggested equation. Complex soliton solutions in terms of dark-bright, dark and bright are constructed. Obtained solutions are constructed in three-dimensional figures to understand these physical phenomena.

Keywords: Sine-Gordon expansion method; Hirota–Satsuma–Ito equation; Complex solutions.

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KANTOROVICH TYPE (p,q)-GENERALIZATION OF BERNSTEIN OPERATORS

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Abstract

In this paper, we introduce a new generalization of Kantorovich type Bernstein operators by means of (p,q)-calculus for $0<q<p\leq 1$ and we derive a recurrence formula for these newly defined operators to give explicit formulas for the m-th order moments and central moments which play an important role in approximation theory.

Keywords: (p,q)-calculus ; Bernstein polynomials; Kantorovich type operators.

Definition 1. Let $0<q<p\leq 1$. Kantorovich type (p,q)-analogue of Bernstein operators is defined as follows:

$$B^*_{n,p,q}(f,x)=\sum_{k=0}^{n} b_{n,k}(p,q,x)\int_0^1 f\left(\frac{p^{n-k}\left([k]_{p,q}+q^k t\right)}{[n+1]_{p,q}}\right) d_{p,q},\quad x\in[0,1],\ n\in\mathbb{N},$$

where $b^{p,q}_{n,k}(x)=\dfrac{1}{p^{n(n-1)/2}}\begin{bmatrix} n \\ k \end{bmatrix}_{p,q} p^{k(k-1)/2}x^k(1-x)_{p,q}^{\ n-k}$.

Lemma 1. For all $n\in\mathbb{N},\ x\in[0,1], m\in\mathbb{Z}\cup\{0\}$ and $0<q<p\leq 1$ we have

$$B^*_{n,p,q}(t^m,x)=\sum_{j=0}^{m}\binom{m}{j}\frac{[n]^n_{p,q}}{[n+1]^m_{p,q}}\frac{p^{nm}}{[m-j+1]_{p,q}}\sum_{i=0}^{m-j}\frac{1}{p^{n(i+j)}}\binom{m-j}{i}\left(q^n-p^n\right)^i B_{n,p,q}\left(t^{i+j},x\right),$$

where $\quad B_{n,p,q}(f,x)=\sum_{k=0}^{n} b^{p,q}_{n,k}(x) f\left(p^{n-k}\dfrac{[k]_{p,q}}{[n]_{p,q}}\right).$

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On the solution of Pavlov equation by The Variational Iteration Method

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Abstract:

In this work, the variational iteration method (VIM) that is a semi-analytical method is applied the $(2+1)$-dimensional Pavlov equation. The numerical results show that only a few terms are sufficient to obtain accurate solutions.

Keywords: The variational Iteration method, $(2+1)$-dimensional Pavlov equation

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THE COMPARISON OF NUMERICAL SOLUTIONS OF COMFORMABLE AND $\beta-$COMFORMABLE FRACTIONAL DIFFERENTIAL EQUATIONS USING NEURAL NETWORK METHOD BY PYTHON

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Abstract

ANNs are mathematical models inspired by biological nerve systems. The neural network method for solving differential equations has recently achieved significant advances in solving fractional differential equations. The Space-Time Inhomogeneous Heat Equation is solved using a neural network method in this research. The loss function comprising initial/boundary conditions is produced using changeable parameters (weights and deviations). A Space-Time Inhomogeneous Heat Equation is also expressed as an optimization problem in this article. To demonstrate the accuracy of the method utilized, numerical examples with proven analytical solutions are described, including numerical results, graphs, weights, and biases. The graphical and tabular results are also thoroughly examined. The average squared errors for various neuron, learning rate, and training steps values are shown.

Keywords: Neural Network Method, Numerical Solutions, Space-time Fractional Differential Equations

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Modeling Potential Distribution of Capparis spinosa in Babadağ Region

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Abstract

Capparis spinosa is a medical plant that has both economic (food, animal breeding, medicine, etc.) and ecological (erosion control, fighting wildfires, etc.) importance and is distributed in the western and southern coastal regions of Turkey. The Maxent model was used to simulate potential distribution areas of spinosa under environmental conditions. The results showed that the potential suitable area of spinosa is 6109 hectares, mainly distributed in below 1000 meters in Babadağ Region. It was determined that the variables contributing to the model were bedrock, elevation, topographic position index and hillshade index, respectively. The acquired model presented excellent performance according to its AUC values (Training AUC: 0.909 and test AUC: 0.906). It is thought that the results revealed in the study will be important for the planning studies to be carried out for the species.

Keywords: Caper, Habitat suitability, MaxEnt, Species distribution modeling.

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ARDUINO BASED DIGITAL TACHOMETER WITH TRACKING PROGRAM

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Abstract

This project; It is made to be used in situations where speed measurement is required in asynchronous motors and to control the data. Arduino Nano R3 and IR Transceiver Sensor, LCD screen and various cables were used in the project.

Especially in asynchronous motors used in industry, synchronization is broken due to some unavoidable situations. The problems experienced in these engines, which are generally used in production, cause problems in operation and then cause serious problems. With this project, instantaneous measurement of engine revolutions will be possible, the received data will be sent to the tracking program created with C#, and faulty times will be monitored in the form of graphics and tables. The sent data is transmitted to the c# software with delays of 0.5 seconds in the first 10 minutes, and 1-3 seconds for 30 minutes and above. Although the deviation of the obtained result is not based on the exact measurements, it is about 3-5%.

The tachometer realized with this project costs 20-30 times cheaper than the ones offered for sale in the market and becomes more advantageous thanks to the tracking program.

Keywords: Tachometer, Arduino, C#, Asynchronous motors

AN APPROXIMATION METHOD FOR THE EIGENVALUE OF A STURM-LIOUVILLE PROBLEM

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Abstract

In this paper, we approximate the eigenvalues of a Sturm-Liouville problem includes the spectral parameter in a boundary condition by associating the problem with Riccati equation. The potential of the problem is real valued, continuous, monoton and symmetric.

Keywords: Sturm-Liouville problem; Asymptotic eigenvalues; Continuous potential.

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ON A GENERALIZATION OF MERSENNE HYBRID NUMBERS

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Abstract

We give a generalization of Mersenne hybrid numbers. We find the Binet formula, the generating function, the sum, the character, the norm and the vector representation of the generalizition. We obtain some relations among this generalizition and well known hybrid numbers. Then we present some important identities, Cassini, Catalan, Vajda, D'ocagne, Honsberger for the generalizition.

Keywords: Mersenne hybrid numbers; Binet formula; Generating function; Cassini identity.

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COMPARATIVE ANALYSIS OF MACHINE LEARNING ALGORITHMS FOR EARLY DIAGNOSIS OF ALZHEIMER'S DISEASE

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Abstract

Alzheimer disease is a disorder that affects the neurochemical systems in the brain and it is characterized by deteriorative changes in the neurons that causes dementia or even memory loss in some patients. The disease usually affects the elderly people aged 65 and above, but it sometimes affects younger people due to the gene that is present in their family history. Therefore, early diagnosis of the disease is very important for the treatment of the disease. In this study machine learning algorithms are used to predict the disease using Alzheimer's dataset. The dataset contains clinical patient data available as open source from Kaggle. The clinical data for the Alzheimer's disease dataset has 373 records, 206 controls and 167 patients, with a set of key indicators of the health of the elderly. The dataset is divided into 70% training and 30% testing dataset. The performances of Naive Bayes, Support Vector Machine, Random Forest, k-Nearest Neighbor and Multilayer Perceptron machine learning algorithms were compared according to model performance criteria using Alzheimer's dataset. Among the algorithms whose performances were compared, the Random Forest Algorithm showed the highest performance. The performance analysis results were found to be 95.59% sensitivity, 91.38% specificity, 90.91% precision, 91.74% f1 score, 83.93% MCC and 91.96% accuracy.

Keywords: Alzheimer’s disease; Machine learning; Early diagnosis; Classification; Predictive diagnostics.

On the Difference Between Numerical and Spectral Radii for Some Analytic Functions of Operator

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Abstract

In this work, some estimates for the difference number between numerical and spectral radii for polynomial, exponential, sine and cosine functions of linear bounded Hilbert space operators via same difference numbers of powers corresponding Hilbert space operators have been obtained.

Keywords: Spectral radius; Numerical radius.

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*Abstract Submission should be prepared only **1 page**.

STATIC RESPONSES OF A CAVITY IN A HALF-SPACE BY USING FINITE ELEMENT METHOD

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Abstract

In this work, static displacement analysis of two dimensional, elastic, isotropic semi-infinite soil space with a cavity are investigated. The analysis is performed by using the finite element method. The region close to the ground is modelled with finite elements, and the region far from the ground is modelled with infinite elements extending to infinity. In the literature, infinite elements used instead of finite elements for infinite media solutions. Infinite element shape functions are generated according to the direction. By using one-dimensional two-node infinite elements and 8-node infinite elements are produced. A finite element with 16 nodes is used to solve the problem. The numerical results compared with the Boussinesq theoretical results. Numerical solutions of finite-infinite elements are obtained by Gauss Legendre integration method. A single load is given from the ground surface. Effects of cavity geometry, point location and material and geometry parameters of soil on the static displacements are investigated. By using finite and infinite model. The finite-infinite element model is coded with MATLAB. Static results are compared.

Keywords: Finite – infinite element; Soil medium; Cavity, Half-Space

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A Fractional Model to Investigate Shape Effects on Thermal Behavior of Brinkman-type Ferrofluid under Thermal Radiation and Heat Injection/Consumption

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Abstract

The prime aim of this article is the construction of a fractional model to enhance the heat transfer rate for magnetohydrodynamic (MHD) convectional transport of ferrofluid by applying the time-fractional concept of Caputo-Fabrizio derivative on Brinkman type fluid model. Kerosene oil and water are considered to serve as carrier fluids for iron oxide (Fe_3O_4) nanoparticles of various non-spherical shapes (brick, cylinder, platelet, and blade). The non-uniform time-dependent motion of an unbounded upward plate causes to generate the flow of ferrofluid. The supplementary physical phenomena such as ramped heating, thermal radiation, and heat injection/consumption are also analyzed. In addition, the effectiveness of using differently shaped Fe_3O_4 nanoparticles for heat transfer and ferrofluid flow is evaluated. The exact solutions for non-integer order modeled differential equations are computed by employing the Laplace transform method. The comparative graphical illustrations for ramped and constant (isothermal) velocity and temperature conditions are prepared to scrutinize the impacts of several associated thermal and physical quantities.

Keywords: Brinkman-type ferrofluid; Fractional model; Shape effect

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Determination of Indicator Plant Species by Indicator Analysis in Red Pine (*Pinus brutia* Ten.) and Black Pine (*Pinus nigra* J.F.Arnold) Forests in Bozdağlar Region

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Abstract

This study was performed to identify the indicator plant species of Red Pine (*Pinus brutia* Ten.) and Black Pine (*Pinus nigra* J.F.Arnold), which are among our target species distributed in Bozdağlar (İzmir-Manisa) Region. Data from sixty-seven sample fields were put to use in the study. The vegetation data matrix was organized as the presence or absence of species. Then, this vegetation data matrix was interpreted by the indicator analysis in the PC-ORD program, and eight positive and five negative indicator species for red pine and six positive indicator species for larch were defined. Among these species, it has been inferred that hairy rock-rose (*Cistus creticus* L.) and sage-leaved rock-rose (*Cistus salviifolius* L.) were the prominent positive indicators for red pine, while dog roses (*Rosa canina* L.) were the most notable negative indicator plant species in the region. For the black pine, it has been concluded *Geocaryum macrocarpum* (Boiss.&Spruner) Engstrand species is the strongest positive indicator plant species in the region.

Keywords:. Bozdağlar, Indicator Plant Species, Red Pine, Black Pine, Indicator Analysis

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Solution of singular boundary value problems using artificial neural networks

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Abstract

In this study, an intelligence computational scheme is presented for solving linear and nonlinear singular models using the well-known artificial neural networks (ANNs), genetic algorithm is a global search scheme, interior-programming algorithm is a competent local search scheme and the hybrid of global and local search. The neural network provides convenient approaches to obtain valuable prototypes based on an unsubstantiated error for singular models. The incentive for awarding this research work originates a consistent structure combines with the influential geographies of ANNs to handle the challenges of the singular models. Broad numerical research is accomplished to indorse the convergence, robustness and accuracy of the suggested numerical scheme. The numerical outcomes are also compared with the true results to examine the perfection of the planned numerical structure.

Keywords: Singular systems, nonlinear, genetic algorithm, interior programming algorithm, hybrid approach

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A NOVEL ANALYTICAL APPROACH TO THE BENJAMIN–ONO EQUATION

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Abstract

In this research, we present some new wave solutions to the second-order Benjamin-Ono equation by using an analytical scheme which is the sine-Gordon expansion method. The Benjamin-Ono equation is similar to the KdV equation and it describes internal waves in stratified fluids. We achieved some travelling wave solutions in terms of hyperbolic functions. All the solutions obtained have been analyzed graphically to their physical properties. We concluded that the proposed method is an efficient method that gives analytical solutions to powerfully nonlinear partial differential models.

Keywords: The sine-Gordon expansion method; Second-order Benjamin-Ono Equation; dark-bright solitary waves

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A novel technique to construct exact solutions for the Complex Ginzburg-Landau equation using quadratic-cubic nonlinearity

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Abstract

The Complex Ginzburg-Landau equation (CGLE) has been suggested and investigated as a model for turbulent dynamics in nonlinear partial differential equations. It is a particularly intriguing model in this aspect since it is a dissipative form of the nonlinear Schrödinger equation. The model is studied with quadratic-cubic law nonlinear fiber by using φ6-model expansion method, bright, dark, dark-singular, singular and dark-bright optical soliton solutions are obtained. The findings of this study might assist in comprehending some of the physical implications of various nonlinear physics models. The hyperbolic sine, for example, appears in the calculation of the Roche limit and gravitational potential of a cylinder, while The hyperbolic cosine function is the shape of a hanging cable (the so-called catenary). Finally, there are some discussions regarding new complex solutions. It is explored by giving physical meaning to the constants found in traveling wave solutions, which are both physically and mathematically significant. Three-dimensional simulations and contour plots are used to enhance these discussions.

Keywords: φ6-model expansion approach, Complex Ginzburg-Landau equation with quadratic cubic nonlinearity; Jacobi elliptic functions, solitons.

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A stochastic computing heuristic scheme for solving a novel third order perturbed delay differential Emden-Fowler model

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Abstract: This study shows the design of novel third order perturbed delay differential Emden-Fowler model. The comprehensive structures based on the singular-point, pantograph and perturbed terms are given along with the shape factor of the third order perturbed delay differential Emden-Fowler model. The novel singular model is simulated by using the artificial neural networks (ANNs) along with the optimization based global/local schemes, i.e., genetic algorithm (GA) and interior-point algorithm (IPA). The constructed of an activation function is provided by using the differential system based on the third order perturbed delay differential Emden-Fowler model. The fitness function's optimization is provided through the hybrid of the ANNs-GA-IPA to solve the third order perturbed delay differential Emden-Fowler model. The exactness, validation, and verification of the system is observed by taking three different cases of the novel mathematical system. The stability, robustness, convergence, and correctness of the numerical scheme is performed through the comparison of the obtainable exact results. For the consistency, the statistical outputs with necessary procedures are obtained by using the ANNs-GA-IPA.

Keywords: Perturbed; Delay; Singular; Artificial neural networks; Local scheme; Global approach; Neurons.

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Analysis of the Effect of the Coriolis Constant on the GpKdV Equation

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ABSTRACT

This study investigated the propagating wave solutions of a nonlinear partial differential equation (NPDE) called the geophysical Korteweg-de Vries (GpKdV) equation. First, the results obtained on the Coriolis effect due to the equation used in geophysics are mentioned. In the nonlinear equation, there is a Coriolis coefficient representing this effect. The traveling wave solution functions that provide this nonlinear mathematical model are obtained using the Modified Exponential Function Method (MEFM). There are trigonometric, hyperbolic, and rational solution functions. In order to understand the physical behavior of all these functions and interpret them effectively, simulated graphics were drawn with the help of a package program.

Keywords: Geophysics Korteweg-de Vries (GpKdV) Equaiton, Coriolis effect, Modified Exponential Function Method (MEFM).

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DEGENERATE ARA TRANSFORM

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Abstract

Kim-Kim [1] (Russ. J. Math. Phys. 2017, 24, 241-248) defined and introduced the degenerate Laplace transform, also investigated some of their several properties. Here, we first define and introduce the degenerate Ara transform and establish several properties and relations. We attain degenerate ARA transforms of power functions, degenerate sine, degenerate cosine, degenerate hyperbolic sine, degenerate hyperbolic cosine, degenerate exponential function, and function derivatives. Furthermore, we present that the degenerate ARA transform is the theoretical dual transform to the degenerate Sumudu transform and the degenerate Laplace transform.

Keywords: Degenerate exponential function, degenerate gamma function, degenerate Laplace transform, degenerate Sumudu transform, Laplace transform, Sumudu transform, Ara transform.

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Numerical Investigation of Particle Distribution in a Cylindrical Channel

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Abstract

Particle distributions in a continuous media is an important research subject for thermo-fluid and computational science, because it is related with pressure drops, reaction rates, and with many other physical phenomenon. In this study particle-laden flow of the nano sized particles in a channel investigated with different flow rates (corresponds to Reynolds number 500, 1000, 1500), , different particle diameters (1e6, 5e6, 1e5), and different particle densities (1500, 2500, 3000 kg/m3). For this purpose water as a continuus phase(Eulerian) used as an inert specie to advect the nanoparticles, different particle shapes (spherical, cube, tetrahedron). Navier-Stokes equations are discretized with 2nd order numerical schemes both temporally and spatially. Structural grid is used as computational domain to represent the cylindirical channel. Distribution of these particles are investigated to understand the behavior of the bulk particle flow in a cylindrical channel.

Keywords: Computational Fluid Dynamics, Two-Way Coupling, Particle-Laden flow, OpenSource

Fractional Modeling and Exact Solutions to Analyze Thermal Performance of Fe_3O_4-MoS_2-Water Hybrid Nanofluid Flow Over an Inclined Surface

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Abstract

The core determination of this article is to investigate the augmentation in the radiative heat transfer rate of Fe_3O_4-MoS_2-H_2O hybrid nanofluid specifying a flow over an inclined plate subject to ramped heating and heat generation/consumption effects. The flow of considered hybrid nanofluid is developed due to the ramped motion of the inclined plate that encounters the magnetic effects and immersed in a porous material. The fractional form of energy and momentum equations is obtained by employing the concept of the Atangana-Baleanu fractional derivative. Some unit-free quantities are introduced and the Laplace transform method is operated to construct the exact solutions of these equations. The noteworthy physical significance of involved parameters is discussed with the aid of graphical illustrations. To analyze the behavior of shear stress and heat transfer rate, numerical computations are tabulated in terms of skin friction coefficient and Nusselt number. All the figures and tables are prepared for both ramped and isothermal boundary conditions to highlight the impacts of the ramped heating condition and ramped motion of the inclined plate.

Keywords: Fractional analysis; hybrid nanofluid; ramped conditions; Laplace transform

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STRUCTURAL DIVERSITY ANALYSIS USING SHANNON'S ENTROPY AND INFORMATION MEASURES

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Abstract

The aim of the present study is to propose a holistic approach in order to estimate structural diversity for forest stands. In this context, we created a hypothetical data set composed of six plots. Each hypothetical plot consists of A (vertical layers), B (species presence and abundance values) and C (horizontal layers) factors. Shannon's entropy and information measures (totally 34 diversity partitions) were computed for each of the plots. Next, principal component analysis was employed using the data set obtained from the diversity partitions of all the plots. The first axis of PCA explained majority of total variance. According to the locations of the plots along with the first PCA axis, not only species richness but also their vertically and horizontally distribution homogeneity played important roles. The PCA results are meaningful since high structural diversity is characterized by high number of species and heterogeneity of vertical and horizontal species distribution. Holistic approach seems to be promise to evaluate structural diversity of forest stands. Further studies should therefore be done to confirm the accuracy of this novel approach using real ecological community data.

Keywords: Biodiversity, forest ecosystems, diversity components, entropy, multivariate analysis

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AUTISM SPECTRUM DISORDER DETECTION USING MACHINE LEARNING ALGORITHMS

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Abstract

Autism Spectrum Disorder is a neurological condition that affects brain development. It is characterized by how the person perceives things, learns, interacts, and socializes with others. It is also said that it is a "behavioral disease" because it affects their social communication such as having poor eye contact with others and repetitive behaviors such as repeating certain words or phrases. Detection of this disorder is associated with remarkable healthcare costs and is time-consuming. However, due to the advancement of Machine Learning algorithms in the diagnosis of many diseases, predicting this disorder using these methods could be beneficial as this could result in an early intervention treatment service that can improve a child's development and hence prevent this disorder to keep going on into adolescence and adulthood stage. Therefore, this paper aims to effective detection of autism spectrum disorder using machine learning algorithms. As the signs of this disorder could be seen at an early stage of a child's development, therefore, to carry out this study we used the autism screening data for toddler's dataset that is publicly available for researchers. This dataset consists of 1054 instances and 17 attributes. Feature selection was made on the dataset using InfoGain, GainRatio, SymmetricalUncert, OneR, CfsSubSetEval, and ChiSquared feature selection algorithms, and their performance are compared. According to their performances, the features that can be used in the differential diagnosis of the disorder and the predictive power of each feature are determined. Moreover, the performances of the Support Vector Machine (SVM), Naïve Bayes, K-Nearest Neighbor, Random Forest, and MLP Classifier classification algorithms were compared.

Keywords: Autism spectrum disorder; Machine learning; Feature selection algorithms; Classification; Effective detection.

ON NUMERICAL SOLUTION OF LID DRIVEN PROBLEM IN A SQUARE CAVITY FILLED WITH NANOFLUID

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Abstract

In this study the numerical solution of wall motion lid driven problem in a square cavity which filled with nanofluid is considered. The equations of motion have been discretised by Finite Difference Method. The system of equations is solved with SOR Method and a MATLAB code is developed and used for simulation. The results are in line with the literature with high compatibility. Indeed, the numerical results obtained from this study are compared with the previous results and presented graphically. The agreement appears to be pretty good. Thus, the solution procedure is implemented for various nanofluids and the graphical results are obtained for different Reynold numbers. The results show that the finite difference method is useful, reliable and accurate for solving this type problems.

Keywords: Finite Difference Method; SOR Method; Nanofluids.

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INVESTIGATING THE DIFFICULTIES OF REFUGEE STUDENTS IN MATHEMATICS COURSE

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Abstract

This study aims to examine the difficulties experienced by refugee students at the middle school level in a mathematics course. In recent decades, there have been large-scale migrations due to war, economic reasons, natural disasters, etc. in several regions in the world. In this context, it is observed that problems arise in the education of the children of people who have to live as refugees in different countries. According to the density of refugees, refugee students are studied in the education system of the country of residence. It is acknowledged from the studies of different researchers that some problems appeared in the adaptation of these students [1, 2]. In this research, a case study was carried out as a qualitative research method with the participation of 85 refugee students in a middle school in the southeastern region of Turkey, where refugees live predominantly, to identify the difficulties and deficiencies experienced by refugee students in the context of mathematics course in Turkey. Data was collected by using semi-constructed interviews with refugee students and examination of students' course documents. Open coding was conducted to obtain themes as a part of qualitative analysis. Some important findings are obtained after the descriptive analysis process. The results demonstrated that refugee students have difficulties in understanding word problems and converting these problems into mathematical language. In addition, students' mathematical knowledge and readiness levels are relatively low than their Turkish counterparts. It is also observed that refugee students have a prejudice against mathematics as native students have. These findings showed that refugee students need more support from teachers and principals to overcome these barriers and difficulties.

Keywords: Mathematics course; Refugee students; Education.

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The traveling wave solutions of Date–Jimbo–Kashiwara–Miwa Equation with Conformable Derivative Dependent on Time Parameter

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Abstract

In this paper, wave solutions of the conformable derivative Date–Jimbo–Kashiwara–Miwa equation were obtained by the modified exponential function method (MEFM). It has been seen that the wave solutions found are functions that have the feature of being periodic functions. By determining the values suitable for the parameters in the obtained wave solutions, two three-dimensional contour and density graphs that simulate the solution functions are drawn.
Keywords: Conformable Date–Jimbo–Kashiwara–Miwa equation; modified exponential function method.

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Uncertainty Principles for the Short-time Non-separable Linear Canonical Transform

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Abstract

The free metaplectic transformation (FMT) or the nonseparable linear canonical transformation (NSLCT) has gained much popularity in recent times because of its various application in signal processing, paraxial optical systems, digital algorithms, optical encryption and so on. However, the NSLCT is inadequate for localized analysis of non-transient signals, as such, it is imperative to introduce a unique localized trans- form coined as the short-time nonseparable linear canonical transformation (ST-NSLCT). In this paper, we investigate the ST-NSLCT. Firstly, we propose the definition of the ST-NSLCT, and provide the time-frequency analysis of the proposed transform in the NSLCT domain. Secondly, we investigate the basic properties of the proposed transform including the reconstruction formula, Moyal's formula. The emergence of the ST-NSLCT definition and its properties broadens the development of time-frequency representation of higher-dimensional signals theory to a certain extent. Finally, we extend some different uncertainty principles (UP) from quantum mechanics including Lieb's inequality, Pitt's inequality, Hausdorff-Young inequality, Heisenberg's uncertainty principle, Hardy's UP, Beurling's UP, Logarithmic UP, and Nazarov's UP.

Keywords: Short-time non-seperable transformation; Moyals formula; Uncertainty Principle; Nazarov's UP; Hardy's UP; Logarithmic's UP

Some results for a nonlinear transmission line arising in the electronic circuit

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Abstract

In this work, we study on a nonlinear transmission line (NLTL) being an electronic circuit consisting of a high-impedance propagating medium with nonlinear capacitive devices.

Keywords: Nonlinear transmission line; analytical method, Complex function solutions.

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THERMAL INSULATION PERFORMANCES OF FOAMED MORTARS CONTAINING BENTONITE BLENDED CEMENTS

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Abstract

The construction sector, which has intense energy consumption, has an important place in the solutions of world energy security problems. Blended cement production and/or using materials with high thermal performance in terms of insulation in buildings are some of these solutions. Bentonite is an alternative material for blended cement production. On the other hand, thermal performances of foamed mortars/concretes are quite high. The main purpose of this study is to determine how the thermal performance and mechanical properties of foamed mortar are affected by blended cements containing bentonite as alternative material. For this purpose, foamed mortar plates containing bentonite blended cements were produced. Bentonite replacement ratios of blended cements were 0, 5, 10 and 15 wt.%. In the study, the strengths and thermal performances of foamed mortars containing bentonite blended cements were determined as experimental. The experiment results were compared among themselves and with each other. From the experiment results, it was concluded that the thermal performances of the foamed mortars containing bentonite blended cements could be improved up to 10% replacement ratio without compromising the strength.

Keywords: Thermal insulation; Foamed mortar; Bentonite; Blended cement.

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Think Before You Define: on Conjugation Relations and Other Connections

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Abstract

Fractional calculus has expanded far beyond the original operators of Riemann–Liouville that it began with: now, fractional integrals and derivatives are being defined every year, with different kernels, behaviours, and applications. But, in the rush to define and use new operators, the nature of mathematics as an interconnected beast is sometimes forgotten. Sometimes, a new operator is defined which is actually the same as an old one, or almost identical to an old one up to some trivial transformation such as a constant multiplication. Sometimes, the transformation required is less trivial, such as an infinite series formula or an algebraic conjugation of operators. This talk will examine some of the many connections between different operators of fractional calculus, and how they can be used to make mathematical work easier, while urging would-be inventors to take account of such connections before declaring an operator to be a new innovation.

Keywords: Fractional integrals; Fractional derivatives; Algebraic conjugation; Philosophy of mathematics.

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DEVELOPMENT OF A NATIONAL SMART METER SYSTEM

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Abstract

The electricity distribution sector in Turkey, which has been privatized since the early 2000's, is divided into 21 regions. This distribution network includes consumer and producer subscribers as well as transformers and lighting. Although the number of meters that are still measured at its location is quite high, the rate of meters read by remote reading systems is increasing day by day. Since world standards such as The International Electrotechnical Commission (IEC) and Device Language Message Specification (DLMS) are used in communication with the meters, there is a much cleaner system, while there is no such standard in communication with gateway devices. For this reason, each gateway manufacturer can create its own protocols and some of them even keep these protocols secret. This situation causes many problems. National Smart Meter System (MASS) is a protocol developed to solve this problem. Thanks to this protocol, which is based on JSON type data and designed in accordance with the most modern communication technologies such as MQ Telemetry Transport (MQTT) and NarrowBand-Internet of Things (NB-IoT), a more efficient and reliable energy reading network will be established.

Keywords: Meter, Gateway, IEC, DLMS, MQTT, NB-IoT.

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COMPUTATIONAL AND SIMULATION STUDY OF ORGANIC SOLAR CELLS BASED ON DONOR – ACCEPTOR MOLECULAR MATERIAL

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Abstract

In this study, we have designed a series of double organic D-π-A (electron donor-π-conjugated-acceptor) dyes employed in dye-sensitized solar cells (DSSCs), the analysis of microelectronic and photonic structure in a one dimension program [AMPS-1D] has been successfully used to study organic solar cells. The program was used to optimize the performance of organic solar cells based on (carbazole-methylthiophene), benzothiadiazole and thiophene [(Cbz-Mth)- B-T]2 as electron donors, and [6,6]-phenyl-C61-butyric acid methyl ester (PCBM) as an electron acceptor. The optoelectronic properties of these dyes were investigated by using the Density Functional Theory DFT/ B3LYP/6-31G(d,p) method. We studied the influence of the variation of the thickness of the active layer, the temperature, and the density of the effective states of the electrons and the holes in the conduction and valence bands respectively on the performance of the solar cells based on [(Cbz-Mth)-BT]2–PCBM as a photoactive material, sandwiched between a transparent indium tin oxide (ITO) and an aluminum (Al) electrode. The addition of other thiophene units in the copolymer or the deposition of a layer of PEDOT between the anode (ITO) and the active layer, improves the performances of the cell, especially resulting in a remarkable increase in the value of the power conversion efficiency (PCE).

Keywords:Donor-Acceptor; solar cells;PEDOT; Thiophene; Power conversion efficiency.

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Application of Mahgoub Transform to Hyers-Ulam Stability of Partial Differential Equations

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Abstract

In this study, we investigate Hyers-Ulam stability of some partial differential equations using Mahgoub Transform method. We also show the Hyers-Ulam constants of these partial differential equations.

Keywords: Mahgoub Transform method; Hyers-Ulam stability; partial differential equation.

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High-Performance of Organic Solar Cells Based on D1-BT-EDOT-BT-D2-A/PCBM Structures

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Abstract

In this paper, six Thiophene-Carbazole-based D-π-A organic dyes were reported. A series of these organic dyes containing identical donor and acceptor group but different π-system. The effect of replacing of thiophene (T) by Phenylene (P), Carbazole (C), Fluorene (F) and Antrhacene (A) as π-system on the physical properties has been focused on. The analysis of microelectronic and photonic structures-one dimension (AMPS-1D) was used to study and simulate the performance of organic heterojunction solar cells based on D1-B-Edot-B-D2-A as electron donors, and [6,6]-phenyl-C61-butyric acid methyl ester (PCBM) as an electron acceptor. The organic photovoltaic cell devices using T3-B-Edot-B-T3-A/PCBM showed the improvement open-circuit voltage Voc, short-circuit current density Jsc, fill factor FF, and power conversion efficiency PCE values for the optimum thickness of 120 nm and the effective state density of electrons and holes of 1021cm-3.The P3-B-Edot-B-T3-A/PCBM and P3-B-Edot-B-P3-A/PCBM based devices exhibited a power conversion efficiency (PCE) of 9.295% and 8.735%, respectively, which outperformed the corresponding T3-B-Edot-B-T3-A/PCBM, Cbz-B-Edot-B-T3-A/PCBM, F-B-Edot-B-T3-A/PCBM, and A-B-Edot-B-T3-A/PCBM based devices (7.330, 6.622, 7.226, and 7.327%). More importantly, the P3-B-Edot-B-T3-A/PCBM and P3-B-Edot-B-P3-A/PCBM -based device delivered the highest PCE of 14.432% and 15.031% respectively, when we deposit a layer of PEDOT between the indium tin oxide (ITO) and the active layer, which is a clear improvement over other result.

Keywords: Donor-Acceptor; Organic Solar cells; PEDOT; Efficiency.

Edgeworth series expansion for option prices

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Abstract

Edgeworth series are a powerful tool in probability used to describe the asymptotic behavior of standardized sum of independent and identically distributed random variables. However, when evaluating options using tree methods, the standard Edgeworth expansion method does not apply directly because only triangular arrays of independent and identically distributed random variables arise. We show how the extension to triangular arrays of the Kolassa-McCullagh approach to Edgeworth series for lattice distributions combined with recent advances in Edgeworth expansion for triangular arrays yield Edgeworth series for digital and standard European put and call options. We develop closed form formula for the coefficients of $1/\sqrt{n}$ and $1/n$ under a general framework. We provide examples with the most popular trinomial models.

Keywords: Edgeworth series; Trinomial models; Option Pricing.

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AN OPTIMAL CONTROL STRATEGY FOR COVID-19 USING REAL DATA

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Abstract

In this study, a new COVID-19 model is proposed. In this context, an integer-order pandemic model is developed to examine the spread of COVID-19 with and without Omicron variant and its relationship with heart attack using real data from Turkey. In the model, an optimal control strategy representing the social distance is considered. Then, the existence, uniqueness, positivity and boundedness of the solution are provided. Qualitative analysis of the proposed model is investigated. In order to estimate the values of the model parameters, the least squares curve fitting method is utilized. Finally, the numerical simulations are presented to examine the dynamic behaviour of the mentioned COVID-19 model of integer-order.

Keywords: COVID-19 mathematical model, optimal control, parameter estimation, numerical simulations.

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Spectral Expansions for a Class Second Order Differential Operator with Eigenvalue Parameter Contained in the Boundary Conditions

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Abstract

We consider the singular boundary value problem generated by differential equation

$$-z'' + p(x)z = \mu\gamma(x)z, \quad 0 < x < \infty \tag{1}$$

and the boundary condition

$$\frac{z'(0)}{z(0)} = f(\mu) \tag{2}$$

where $\mu = \lambda^2$ is a spectral parameter, $p(x) \in L_1(0,\infty)$ is a real valued function and satisfying the condition

$$\int_0^{+\infty} x|p(x)|dx < \infty.$$

Here $\gamma(x)$ is real positive piecewise continuous function and $f(\mu)$ in the condition (2) is a meromorphic function.

In this work, the scattering problem of the boundary value problem (1)-(2) is studied. The expansion formula according to the eigenfunctions under certain conditions is obtained by applying Titchmarsh method [1]. Inverse problems of scattering theory were investigated in [2,3].

Keywords: Expansion formula; eigenfunction; scattering problem.

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Application of tan $\left(\frac{\Phi(\xi)}{2}\right)$-expansion scheme for solving two nonlinear partial differential equations arising in chemical and biological phenomena

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Abstract

In this paper, the reaction-diffusion Brusselator system and the Radhakrishnan, Kundu and Laskshmanan (RKL) equation. Based on the new technique namely tan $\left(\frac{\Phi(\xi)}{2}\right)$-expansion method the solution procedure of nonlinear evolution equations in chemical and biological phenomena are investigated. We obtained the plenty of exact solutions for mentioned.

Keywords: tan $\left(\frac{\Phi(\xi)}{2}\right)$-expansion technique; reaction-diffusion Brusselator system; the Radhakrishnan, Kundu and Laskshmanan (RKL) equation.

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ANALYSIS OF THE SOLUTIONS OF A SPACE-TIME FRACTIONAL MATHEMATICAL MODEL WITH AN ANALYTICAL METHOD

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Abstract

In the present paper we have considered a nonlinear equation including the modified Riemann-Liouville fractional derivative of Jumarie, namely space-time fractional Calogero-Degasperis (CD) equation. The analytical solutions of CD equation which describes the (2+1)-dimensional interaction of a Riemann wave propagating along the y-axis with a long wave along the x-axis, are constructed by the modified exponential function method. The proposed method is easy to implement and powerful. Consequently three types of exact solutions are obtained as hyperbolic function solutions, trigonometric function solutions and rational solutions. The appropriate graphical results are presented to the related cases.

Keywords: Modified exponential function method; Space-time fractional Calogero-Degasperis equation; Traveling wave solutions.

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Solitary wave solutions to a nonlinear mathematical model

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Abstract

The solitary wave solutions to a nonlinear mathematical model arising in mathematical physics are established in this study. To construct such novel solutions, we employ robust integration technique called modified Sardar method. The novel soliton control structure has been studied in order to explain specific physical problems. Three-dimensional and contour graphs have been plotted using suitable choice of the values of parameters involved.

Keywords: Nonlinear equation; Sardar method; Solitary waves.

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Exact solutions to the coupled-Higgs equation with neutral scalar mesons cooperating in a system

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Abstract

In the present study, through the generalized exponential rational function method (GERFM), we constitute exact wave solutions for the coupled-Higgs equation (CHE). The proposed method is one of the most powerful method to construct abundant exact solutions for nonlinear partial differential equations. The obtained wave solutions include hyperbolic, trigonometry, and exponential functions solutions. Furthermore, we draw three-dimensional surfaces and counter plots of the obtained solutions using the appropriate value for involved parameters.

Keywords: The coupled-Higgs equation, generalized exponential rational function method (GERFM), hyperbolic, trigonometry, and exponential functions solutions.

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FORMULATION OF A 7-DOF HALF-CAR MODEL WITH NONLINEAR SPRINGS AND DAMPERS FOR RIDE COMFORT ANALYSIS OF IN-WHEEL-MOTOR ELECTRIC VEHICLES

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Abstract

In this paper, we formulate a seven-degree-of-freedom half-car model for ride comfort analysis of electric vehicles with in-wheel motors. All the springs and dampers in the model are considered to exhibit cubic nonlinearities in addition to their linear characteristics. In this manner the nature of the corresponding vehicle components is described realistically. The equations of motion are obtained by using the Lagrangian method. The resulting system of ordinary differential equations can be numerically integrated to simulate vibrations due to road irregularities and unbalance of rotating parts.

Keywords: Electric vehicle; Half-car model; Vehicle dynamics.

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ANALYSIS OF CRYPTOGRAPHIC HASH FUNCTIONS FOR BLOCKCHAIN TECHNOLOGY

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Abstract

Blockchain is one of the most interestingly evolving technologies today. This study presents a mathematical analysis of cryptographic hash functions, which is the most important element of the security foundations of this technology.

Keywords: hash functions, blockchain, cryptographic hash functions analysis.

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*Abstract Submission should be prepared only **1 page**.

Application of Fractional Operators to Modified Special Functions

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Abstract

The motive of this paper is to apply Riemann-Liouville and Erdelyi-Kober fractional integral operators and Riemann-Liouville and Caputo fractional derivative operators to modified beta, modified Gauss hypergeometric and modified confluent hypergeometric functions.

Keywords: Gamma function; Beta function; Gauss hypergeometric function; Confluent hypergeometric function; Generalized M-series; Fractional operators.

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A STOCHASTIC MODEL FOR THE ENERGY-EFFICIENT SERVER CONSOLIDATION

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Abstract

Data centers form the infrastructure of information technologies (IT). Most of the Internet Protocol (IP) address, for example, traffic passes through these data centers. Moreover, the IP address data is stored at data centers. To cope with this increasing flow, many processing and storage servers are needed. However, data centers have large investment costs and high energy use. The most important data center cost factors are operating cost and energy cost. Here, there are many factors considered for energy usage in servers and different resource types like CPU, bandwidth, and memory. The CPU, on the other hand, is generally the most energy-consuming part of servers. The most important technology used to save energy in physical servers is virtualization. Virtualization enables many virtual servers to run on a single physical server. In this study, we aim to meet the resource needs of virtual servers by minimizing energy consumption in a datacenter. In other words, here we mention how much energy physical servers consume according to the amount of CPU used. Here, it is assumed that there is a linear relationship between CPU and energy usage. The workloads of the services running on virtual servers change in time. With the change of these workloads, the amount of CPU used by virtual servers' changes. For this purpose, we propose a stochastic model for server consolidation under resource demand uncertainty. This model, which presents the ambiguous workload, is a scenario-based stochastic programming model. According to the result, in the consolidation of virtual servers with uncertain resource demand, energy costs are minimized.

Keywords: Server Consolidation, Stochastic, Modelling, Data center.

A NEW GENERALIZED DISTRIBUTION FOR ESTIMATION OF FLOOD AND EARTHQUAKE SIZES IN TURKEY

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Abstract

Earthquakes and floods are among the most common natural disasters in Turkey. Therefore, in this study, it is aimed to contribute to the minimization of the risks of these disasters by examining a new distribution that is thought to be more flexible for the estimation of the magnitudes of these two disaster types for Turkey.

In this study, a new generalized distribution based on the sine function was obtained, and the skewness, kurtosis, peak value, survival and hazard functions, and maximum likelihood estimates of this distribution were obtained. The superiority of the generalized distribution over the existing distributions in the literature is demonstrated in practice on real datasets based on earthquake and landslide data.

Keywords: Earthquake, Flood, Maximum Likelihood Estimate, Generalized Distributions

Acknowledgement: We like to thank to the support by The Scientific and Technological Research Council of Turkey (TUBITAK) ARDEB 1001 [Project number: 121F208] program. The authors also thank Assoc. Prof. Dr. Senem Tekin and Asist. Prof. Dr. Tuba Azak for preparing data set and Prof. Dr. Tolga Çan for his valuable advice.

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AN OPTIMAL CONTROL PROBLEM FOR n-DIMENSIONAL SCHRODINGER EQUATION WITH SPECIFIC GRADIENT TERM

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Abstract

In this paper, we study an optimal control problem n-dimensional Schrödinger equation with specific gradient term which arise in atomic and molecular physics, pyhsical chemistry, nuclear physics and optics. The objective functional is given by an integral criterion over boundary of domain. In the present paper, we prove the solvability of considered optimal control problem in which control is a complex-valued function such that its real and imaginary parts are measurable bounded functions.

Keywords: Optimal control; Schrödinger equation; objective functional.

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MARKOV RENEWAL MODEL APPLIED TO THE ESTIMATION OF EARTHQUAKE OCCURRENCES

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Abstract

The process of earthquake occurrences can be represented with many analytical models (Votsi et al.[1]). Some models are based on empirical observations of preliminary events, other models on physical modelling of the earthquake process and some on statistical analysis of patterns of seismicity. The theory of Markov processes can ben applied in various fields since the Markov property is very intuitive. However, the Markov property has its limitations. It enforces restrictions on the distribution of the sojourn time in a state, which is exponentially distributed in the continuous case. This is a disadvantage when Markov processes are applied in real-life applications. Therefore, in this study, we use the Markov renewal process to apply a previously proposed method for seismic disaster detection and specifically to model large earthquakes consistently using high-intensity earthquake data that occurred in Turkey during the 20th century. Among the common non-Poisson models, the Markov renewal process proposed by Garavaglia and Pavani. A mixture of exponential and Weibull distributions is used for interevent times by R program

Keywords: Earthquake, Markov Process, Renewal Process, Weibull Distribution

Acknowledgement: We like to thank to the support by The Scientific and Technological Research Council of Turkey (TUBITAK) ARDEB 1001 [Project number: 121F208] program. The authors also thank Assoc. Prof. Dr. Senem Tekin and Asist. Prof. Dr. Tuba Azak for preparing data set and Prof. Dr. Tolga Çan for his valuable advice.

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An efficient linearized approximation technique for the non-linear two-dimensional coupled Burgers equation

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Abstract

In this article, the numerical solution of the non-linear two-dimensional coupled Burgers equation given by initial and boundary conditions has been carried out by linearized implicit finite difference method. Fourier stability analysis of the proposed method has been performed and four different models are applied to the problem. In order to demonstrate the accuracy and validety of the method, the error norms L_2, L_∞ and E_R with some numerical results have been calculated and compared with those available in the literatüre for the same parameters.

Keywords: Two-dimensional Burgers equation; Linearized implicit finite difference; Fourier stability analysis.

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Solutions to the (n+1)-dimensional NLSE equation with M-truncated derivative

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Abstract

The solutions with M-truncated derivatives to the (n+1)-diminsional nonlinear Shrodinger equation (NLSE) with Kerr and power law nonlinearities are derived in this study. To reach such solutions, we employ the undetermined coefficient approach. The novel soliton control structure has been studied in order to explain particular physical difficulties. These discoveries have been used to the transmission of long-wave and high-power telecommunication networks, which has proven to be beneficial. The circumstances required for the existence of these solitons are provided.

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New exact solutions of the Coupled-Higgs equation using the ϕ^6-model expansion method

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Abstract

In this study, we investigate the coupled-Higgs equation (CHE), which represents a system of preserved scalar nucleons collaborating with unbiased scalar mesons with the use of symbolic computation, the ϕ^6-model expansion method. The trigonometric and hyperbolic functions are obtained based on $m \to 1$ and $m \to 0$ are degenerated state of the Jacobi elliptic functions. All obtained solutions verify the partial differential equation under the given constrained conditions. To shed more light on the dynamic behavior of the obtained solutions, we illustrated 3D surfaces and 2D graphics of some solutions constructed with the help of a computer program.

Keywords: Exact solutions; Coupled-Higgs equation; The ϕ^6-model expansion method.

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PERFORMANCE EVALUATION OF MACHINE LEARNING ALGORITHMS FOR DETECTING EATING AND PHYSICAL STATUS BASED OBESITY STAGES

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Abstract

Obesity is the excess of body weight relative to height above the desired level as a result of excessive increase in the ratio of body fat mass to lean mass. It causes many health problems due to its negative effects on body systems (endocrine system, cardiovascular system, respiratory system, gastrointestinal system, skin, genitourinary system, musculoskeletal system) and psychosocial status. In this study is aimed to effective detection of the eating and physical condition based obesity stages using machine learning algorithms. The dataset contains data for the estimation of obesity levels in individuals from the countries of Mexico, Peru and Colombia, available as open source from UCI Machine Learning Repository. The data contains 17 attributes and 2111 records. The records are labeled with the class variable obesity stages, that allows classification of the data using the values of insufficient weight, normal weight, overweight level I, overweight level II, obesity type I, obesity type II and obesity type III. The 10-fold cross-validation method was used to validate the model and the performances of the Support Vector Machine, Random Forest, and Multilayer Perceptron classification algorithms were compared. It has been determined that the highest performance among the algorithms whose performances are compared belongs to the Random Forest Algorithm (95.78%).

Keywords: Machine learning, obesity, UCI, Random Forest

RECTANGULAR MICROSTRIP ANTENNA DESIGN FOR WIRELESS TECHNOLOGIES

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Abstract

A rectangular microstrip antenna operating for wireless technologies (Wi-Fi, Bluetooth and ISM) is designed which is made of PF-4 having dielectric constant of 1.06, loss tangent of 0.0001 and antenna patch and ground part consist of copper band whose one side is sticky. Operating frequency is 2.45 GHz. Its operating band is between 2.4136 GHz and 2.4791 GHz. Its gain at the critical frequency is 5.109 dB.

Keywords: Wifi; Bluetooth; ISM; Microstrip Antenna.

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STATISTICAL CONVERGENCE ON MULTIPLICATIVE CALCULUS

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Abstract

In this study, our aim is to give concepts of density, statistical convergence, statistically Cauchy sequence, Cesaro summability and λ-statistical convergence on multiplicative calculus as a special case of non-Newtonian calculus. Especially, if a generator on non-Newtonian calculus is determined as identity function, all results in the classical case are reached.

Keywords: Statistical convergence; Statistical Cauchy sequence; Cesaro convergence; Non-Newtonian calculus; Multiplicative calculus.

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USE OF FRACTIONAL DERIVATIVE IN DIFFERENTIAL GEOMETRY

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Abstract

This talk discusses how to use the tools of fractional calculus in differential geometry of curves. Although there are many fractional derivative operator, we consider the fractional derivative of Caputo type among others because it takes a constant function to zero. Caputo fractional derivative, however, has some disadvantages where the Leibniz rule and the derivative of composite functions are given by infinite series, which these are essential for the study of differential geometry of parametrized objects. In order to overcome these troubles, we will be interested in a simplification for Caputo fractional derivative of composite functions that was first proposed in [1]. Via this simplification, we interpret the differential geometry of curves. In addition, by using the gradient in terms of Caputo fractional derivative (see [2]), we will investigate the geometry of level curves, that is, those curves given in an implicit equation.

Keywords: Caputo fractional derivative; Affine geometry; Euclidean geometry, level curves, parametrized curves.

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Dynamic behavior of the Fokas system arising in monomode optical fibers through the unified auxiliary equation method

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Abstract

In this study, we investigate the Fokas system which represents the spread of irregular pulse in monomode optical fibers by using the unified auxiliary equation method, which is the most powerful method for exploring exact solutions for nonlinear models. The wave transform is used in order to convert a partial differential equation into an ordinary differential equation. As a result, several distinct solutions are obtained such as dark, bright, dark–bright, singular, Jacobi elliptic function, and exponential solutions. Furthermore, 3D surfaces and 2D graphics for the obtained solutions are drawn by choosing appropriate values for the involved free parameters. particular values to the parameters involved.

Keywords: Fokas system; the unified auxiliary equation method; Exact solutions.

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ARTIFICIAL INTELLIGENCE BASED DEMAND PREDICTION MODELS

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Abstract

Accurate demand forecasting allows companies to efficiently serve their customers' needs without investing large amounts of capital, helping to effectively lower overall operational costs. The purpose of this research is to predict the future demand of products sold in the online stores so that stocking of the product can be managed correctly. For this purpose, two different approaches were developed to accurately predict the sales of a product in six different stores in the online marketplace. The first approach utilizes deep learning based univariate time series Temporal Convolutional Networks (TCN) method whereas the second approach applies supervised machine learning based Extreme Gradient Boost (XGBoost) method to develop prediction models. In the second approach, models were created with and withouth minimum Redundancy Maximum Relevance (mRMR) feature selection algorithm. The dataset includes 5675 rows of data and includes sales counts of a product along with some other features. The sales counts in the last month of the dataset were predicted. Mean Absolute Error (MAE) was used for evaluating the performance of the prediction models. The results show that for six different stores, MAE values ranged from 6.37 to 21.89 for models developed with XGBoost, from 5.68 to 13.08 for models developed with XGBoost after mRMR and from 5.79 to 13.37 for models developed with TCN.

Keywords: : Demand forecasting, Machine learning, Deep learning

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Diversity of wave structures to the conformable fractional dynamical model

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Abstract

This manuscript examines the recently developed conformable three-dimensional Wazwaz-Benjamin-Bona-Mahony (3D-WBBM) equation's dynamical behavior in terms of its spatial and temporal variables. The governing equation is stretch for the Korteweg-de-Vries equation that represents the unidirectional propagation of small amplitude long waves on the surface of hydro magnetic and acoustic waves. Solitary wave solutions of various types, such as kink and shock, as well as singleton, combined solitons, and complex solitons, are all retrieved. Additionally, solutions to hyperbolic, exponential, and trigonometric functions are obtained through the use of recently developed methods, namely the Kudryashov method (KM), the modified Kudryashov method (MKM), and the new extended direct algebraic method (NEDAM). The study conducts a comparison of our findings to well-known findings, and concludes that the solutions reached here are novel. Additionally, the earned results are sketched in different shapes to demonstrate their dynamics as a function of parameter selection. We can assert from the obtained results that the applied techniques are simple, vibrant, and quite well, and will be helpful tool for addressing more highly nonlinear issues in various of fields.

Keywords: Integrability; soliton solutions; 3D-WBBM equation; Kudryashov and modified Kudryashov method; NEDAM.

Optical solitons of Complex Ginzburg-Landau equation having dual power nonlinear form using $\varphi 6$-model expansion approach

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Abstract

The Ginzburg-Landau equation is a well-known partial differential equation in mathematics and physics, and it is applied to the research of superconducting phenomenology theory, which is widely used to describe the propagation of optical solitons over optical fibers over long distances. This paper employs a novel $\varphi 6$-model expansion approach to get dark, bright, periodic, dark-bright and singular soliton solutions to the complex Ginzburg-Landau equation with dual power-law nonlinearity. The dual-power law found in photovoltaic materials is used to explain nonlinearity in the refractive index. The results of this paper may assist in comprehending some of the physical effects of various nonlinear physics models. For example, the hyperbolic sine arises in the calculation of the Roche limit and the gravitational potential of a cylinder, the hyperbolic tangent arises in the calculation of the magnetic moment and the rapidity of special relativity and the hyperbolic cotangent arises in the Langevin function for magnetic polarization. Finally, there are some discussions regarding new complex solutions. It is explored by giving physical meaning to the constants found in traveling wave solutions, which are both physically and mathematically significant. Three-dimensional simulations are used to enhance these discussions.

Keywords: $\varphi 6$-model expansion approach, Complex Ginzburg-Landau equation; Jacobi elliptic functions, solitons.

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MODELING OF SPECIES DISTRIBUTIONS WITH DEEP LEARNING METHOD

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Abstract

There are many methods used in species distribution modeling. In recent years, the deep learning method has started to be included in these methods due to its modeling performance. In the present study, potential distribution modeling of Turkish red pine was carried out using the deep learning method with Python. In addition to having distinctive site conditions within its wide distribution, the fact that it is an ecologically and economically important species is the main reason for the Turkish red pine being the target species in this study. Considering that they may be effective in the potential distribution of the Turkish red pine, the following independent variables for modeling were chosen: elevation, topographic position index, bio1, bio8, bio12, bio14, distance from the sea, latitude and longitude. As a result of this deep learning application, it has been determined that the model is successful in terms of AUC values. According to the model map, it was observed that the determined potential areas coincided with the results from the studies conducted on the ecology of the same taxon. The results from this study showed that the deep learning method can be an effective tool for species distribution modeling.

Keywords: Deep learning, Neural network, Python, Species distribution modeling, Turkish red pine.

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THE NEW SOLUTIONS OF CONFORMABLE FRACTIONAL WHITHAM-BROER-KAUP EQUATIONS

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Abstract

In this study, I have studied conformable q-homotopy analysis transform method for obtaining the new solutions of conformable fractional Whitham-Broer-Kaup equations. The graphs of the numerical solutions for conformable fractional Whitham-Broer-Kaup equations are plotted in MAPLE software.

Keywords: Conformable q-homotopy analysis transform method; conformable fractional Whitham-Broer-Kaup equations; conformable fractional derivative.

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INVESTIGATION OF OPTICAL SOLITONS TO THE NONLINEAR COMPLEX KUNDU-ECKHAUS AND ZAKHAROV-KUZNETSOV-BENJAMIN-BONA-MAHONY EQUATIONS IN CONFORMABLE

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Abstract This research focuses on the extraction of dark-bright solitons and periodic wave distributions of two models, namely, the Zakharov-Kuznetsov-Benjamin-Bona-Mahony equation and complex Kundu-Eckhaus equation with conformable derivative. To reach these important properties, the generalized exponential rational function method is considered. To observe wave distributions in periodic and singular sense, dynamical behaviour modulus of solutions are also archived. Strain conditions for validity of results obtained in this paper are also reported.

Keywords: Zakharov-Kuznetsov-Benjamin-Bona-Mahony equation, Nonlinear complex Kundu-Eckhaus equation with conformable, The generalized exponential rational function method,

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Scattered Geometrical Optics Field by a Perfectly Conducting Half Plane Between Two Isorefractive Media

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Abstract

Scattered geometrical optics field of plane electromagnetic waves by a perfectly conducting half plane between two isorefractive media is derived by means of the method of transition boundary. The interface between the two media is considered as a resistive surface and affects the reflection and transmission coefficients of the half plane, and it has both reflection and transmission coefficients. Initial field is determined first by excluding the half plane causing diffraction from the geometry. Secondly total geometrical optics field is determined. Finally, scattered geometrical optics field is obtained by subtracting the initial field from the total geometrical optics field.

Keywords: Scattered geometrical optics; Conducting half plane; isorefractive media

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ANALYSIS OF TRAVELING WAVE SOLUTIONS OF NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS

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ABSTRACT

In this article, traveling wave solutions of the nonlinear partial differential equations have been analyzed using the modified exponential function method (MEFM). This method was applied to analytical traveling wave solutions of the Calogero Bogoyavlenskii Schiff (CBS) and Whitham Broer Kaup (WBK) equations. Solution functions were obtained through a mathematical program. Two, three- dimensional and contour graphs expressing the behavior of solution functions representing the mathematical model were plotted with the help of the Mathematica package program by determining the appropriate parameters.

Keywords: Calogero Bogoyavlenskii Schiff (CBS) and Whitham Broer Kaup (WBK) Equaiton, Nonlinear Partial Differential Equations, Modified Exponential Function Method.

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SOME CONVERGENCE RESULTS FOR A NEW GENERALIZED NONEXPANSIVE MAPPINGS IN UNIFORMLY CONVEX HYPERBOLIC SPACE

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Abstract

In this paper, we introduce a new generalized class of nonexpansive mappings. Also we establish some strong and Δ-convergence theorems of an iteration process for approximating fixed point of these mappings in a uniformly convex hyperbolic space

Keywords: Fixed point; Generalized nonexpansive mappings; Uniformly convex hyperbolic space.

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A FIXED POINT THEOREM IN B-METRIC SPACES AND AN APPLICATION TO SPECTRAL ASYMPTOTICS OF SOLUTIONS OF OPERATOR EQUATIONS

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Abstract

In this paper, we prove a fixed point theorem for eventually contracting maps on b-metric spaces and use it to study eigenvalue bounds for solutions of operator equations in quasi-Banach operator ideals.

Keywords: Fixed point; B-metric space; Quasi-Banach operator ideals.

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A TURBULENCE MODEL WITH SLIP WITH FRICTION BOUNDARY CONDITION

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Abstract

In this study, the slip with friction boundary condition is applied to Navier-Stokes-ω model [1]. Numerical tests are performed using this boundary condition on two-dimensional channel flows across a step and on the bottom wall. The influence of the friction parameters are investigated for different Reynolds numbers. For this reason, the reattachment points are calculated and compared with the reference solutions for different Reynolds numbers and friction coefficients. The reference solutions are obtained with Navier-Stokes equation with no-slip boundary conditions on fine grid [2]. Finally, with the help of the results obtained the effect of the friction coefficient on the flow is explained.

Keywords: Navier-Stokes-ω model, turbulence model, reattachment point, slip with friction boundary condition.

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A NEW GENERALIZATION OF THE APOSTOL-EULER AND APOSTOL-GENOCCHI POLYNOMIALS

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Abstract

In the present study, we introduce new type Apostol-Euler polynomials and Apostol-Genocchi polynomials with three variables via generating functions using the Euler formula and operational methods. By means of these generating functions, some identities, multiplicative and derivative operators are obtained. We also examine Gould-Hopper-Apostol-Euler and Genocchi polynomials, and Hermite-Appell-Apostol-Euler and Genocchi polynomials by considering special cases.

Keywords: Apostol-Euler polynomials and numbers; Apostol-Genocchi polynomials and numbers; Generating function.

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GENERALIZED OF HERMITE MATRIX POLYNOMIALS AND SOME PROPERTIES

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Abstract

In this study, we introduce generalized Hermite matrix polynomials defined with the help of generalized exponential function. For this family of polynomials, some properties such as recurrence relation, inversion formula are obtained. In addition, the relationship of generalized Hermite matrix polynomials with the Beta function is emphasized.

Keywords: Hermite matrix polynomials; Dunkl generalization; Recurrence relation.

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On The Periodic Solutions of a Nonlinear Differential Equation with Variable Delays

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Abstract

We obtain new results for existense of periodic solutions of a nonlinear differential equation with variable delays. Our findings have a contribution to the topic and complete that in the relevant literature.

Keywords: Nonlinear differential equation; periodic solutions.

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A UNIFORM NUMERICAL APPROACH FOR SINGULARLY PERTURBED FREDHOLM INTEGRO-DIFFERENTIAL EQUATION

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Abstract

This article deals with a finite difference method for solving a singularly perturbed Fredholm integro-differential equation. For the numerical solution of the problem, we use an exponentially fitted difference scheme on a uniform mesh which is succeeded by the method of integral identities with the use of exponential basis functions and interpolating quadrature rules with the weight and remainder terms in integral form. The method is shown to be first-order convergent in the discrete maximum norm. Parameter uniform error estimates for the approximated solutions are established. The numerical example validates the theoretical results.

Keywords: Finite difference scheme; Fredholm integro-differential equation; Singular perturbation; Uniform convergence.

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The examination of the quotient of numerical semigroup with RF-matrices

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Abstract

In this paper, we study quotients of a numerical semigroups with RF (Row-Factorization) matrices. We prove a formula for the Frobenious number of quotients of some families of numerical semigroups. Moreover, we examine half of the numerical semigroups, pseudo-symmetric numerical semigroups.

Keywords: *Quotient of A Numerical Semigroup; Pseudo-Frobenious Number; RF (Row Factorization) Matrices.*

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ON SOLUTIONS OF INTEGRAL EQUATIONS IN GEOMETRIC ANALYSIS

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Abstract

In this paper, we will give definitions of types of integral equations on geometric analysis. And solutions of different types of integral equations in geometric analysis will be examined. These studies will be reinforced with examples.

Keywords: Multiplicative integral equation; Multiplicative Fredholm integral equation; Multiplicative Volterra integral equation; Multiplicative Volterra-Fredholm integral equation.

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ON SOLUTIONS OF FIRST AND SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS IN GEOMETRIC ANALYSIS

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Abstract

In this work, the solutions of first and second order linear differential equations in geometric analysis will be focused on. For this, multiplicative power series will be used. These studies will be reinforced with examples.

Keywords: Geometric analysis; Linear differential equation; Multiplicative power series.

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SOME PROPERTIES OF THE PARAMETRIC KIND OF FUBINI POLYNOMIALS WITH THREE VARIABLES OF ORDER r

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Abstract

In this study, we introduce Fubini polynomials with three variables of order r with the help of generating functions. We derive addition formulas, summation formulas, trigonometric relation, differential formulas. Also we prove some relation between our polynomials and Stirling numbers.

Keywords: Fubini polynomials; Summation formulas; Trigonometric relation.

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ON A NEW TYPE OPERATORS INCLUDING THE APPELL POLYNOMIALS AND ITS APPROXIMATION PROPERTIES

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Abstract

The purpose of this paper is to define a new sequence of linear positive operators including the Appell polynomials. We have convergence properties of this operators such as the Korovkin's theorem, modulus of continuity, Lipschitz class and Voronovskaja-type theorem. Then, a Kantorovich form of this operators and its some approximation properties are given.

Keywords: Appell polynomials; Szàsz operators; Voronovskaja-type theorem.

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THE NUMERICAL SOLUTION OF SINGULARLY PERTURBED DELAY INTEGRO-DIFFERENTIAL EQUATION

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Abstract

In this study, we use differential transform method to numerical solve delay integro-differential equations. Both theory and application of integro-differential equation are a very important in applied mathematics. These equations are used to mathematical models for many physical situations. The differential transformation method is an iterative procedure to obtain serial solutions of ordinary and partial differential equations. For this reason, it is used to solve the delay integro-differential equations in the study. The reliability, effectively, and simplicity of the proposed method are proved by the results of applying the method on thesingularly perturbed delay integro-differential equations.

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Fine Grinding of Marble Waste: Preliminary Test Results

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Abstract

The aim of this study was to investigate the production of ultrafine material from marble wastes. For this purpose, marble wastes were ground to fine sizes using planetary ball mill with porcelain milling media. The milling tests were performed at a constant mill speed of 150 rpm with three different ball to powder ratios (2.5, 5 and 10) and variable grinding times up to 240 min. The particle size analyses showed that the mean particle size (d_{50}) of the milled products was significantly reduced compared to the feed size. Finally, the preliminary test results from planetary milling indicated that marble wastes can be ground to the desired fine particle sizes for industrial utilization.

Keywords: Marble waste; Ultrafine grinding; Planetary ball mill.

ON THE SEMI-ANALYTICAL METHODS FOR THE FIFTH ORDER NONLINEAR KdV EQUATIONS

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Abstract

In this study, the Caudrey-Dodd-Gibbon (CDG), Sawada-Kotera (SK) and Caudrey-Dodd-Gibbon-Sawada-Kotera (CDGSK) equations being from the class of fifth-order nonlinear KdV equations are investigated. Adomian Decomposition Method (ADM) and modified Variational Iteration Method (mVIM) are proposed semi-analytical solutions for the CDG, SK and CDGSK equations. ADM and mVIM solutions of these equations are compared with both their exact solutions and each other by using tables and graphs. Also, it is visualized using curve and surface graphs. It is shown that the semi-analytical solutions are calculable, convenient and highly compatible with the analytical solutions.

Keywords: Caudrey-Dodd-Gibbon (CDG) equations; Sawada-Kotera (SK) equations; Caudrey-Dodd-Gibbon-Sawada-Kotera (CDGSK) equations; Adomian decomposition method (ADM); modified variational iteration method (mVIM).

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A NEW CONSTRUCTION METHOD FOR TRIANGULAR NORMS AND TRIANGULAR CONORMS ON BOUNDED LATTICES

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Abstract

A triangular norm T (resp. triangular conorm S) is a binary operation on a bounded lattice L such that it is commutative, associative, increasing in each variable and satisfies the boundary condition $T(1,x) = x$ (resp. $S(0,x) = x$) for all $x \in L$. A triangular subnorm F (resp. triangular superconorm Q) is obtained by changing the boundary condition of triangular norm (resp. triangular conorm) into the condition that $F(x,y) \leq \inf\{x,y\}$ (resp. $Q(x,y) \geq \sup\{x,y\}$) for all $x, y \in L$. In this paper, we demonstrate that it is possible to describe a construction method for triangular norms and triangular conorms on a bounded lattice L derived from triangular subnorms and triangular superconorms defined on the subinterval of L, respectively.

Keywords: Triangular norm; Triangular conorm; Triangular subnorm; Triangular superconorm.

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INVESTIGATION OF THE EFFECT OF VACCINATION IN TURKEY ON PNEUMONIA CASES CAUSED BY COVID-19 WITH A SEIR TYPE MODEL

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Abstract

In this study, a SEIR type compartmental disease model was developed to investigate the impact of vaccination on the evolution of disease to pneumonia during the COVID-19 epidemic. The stability of the developed model and the basic reproduction number was also calculated. To arrive at numerical solutions of the model two periods of 63 days, the unvaccinated-first vaccinated and the first vaccinated-second vaccinated period, were taken as basis. Data for these periods were obtained from the website of TR Ministry of Health. The graphs of the numerical solutions were drawn and their compatibility with the real data was shown.

Keywords: COVID-19; SEIR epidemic model; local stability; basic reproduction number; numerical solution.

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NON-CANAL CIRCULAR SURFACES GENERATED BY SPECIAL CURVES WITH ALTERNATIVE FRAME AND QUATERNION

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Abstract

In this paper, we show that non-canal circular surfaces can be obtained by Alternative frames of the special curves and obtain some corollaries. Besides, these surfaces are obtained by quaternion and homothetic motion.

Keywords: Non- Canal Circular Surface; Alternative Frame; Bertrand curve; Involute-Evolute curve; Quaternion; Rotation matrices; Homothetic motion.

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DISTRIBUTION OF DISCRETE GEODESICS ON ALPHA COMPLEXES

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Abstract

In this study, the shortest paths calculated on the graph structures expressed by alpha complex skeleton of the submanifold from which the point cloud is sampled will provide an approximation to the geodetic curves of the manifold. It should also be taken into account that this sampling will contain noise. Although the graph structures formed by the simplex complex skeleton are affected by this noise, the approaches to the geodesics of the submanifold are not affected much by the distributions of the geodesics. Thus, a kernel function to be defined by the Wasserstein similarity of the distributions of discrete geodesics in the skeletons of 3D point clouds will be an effective tool in the point cloud similarity measurement process.

Keywords: Discrete geodesics; Alpha Complex; Point cloud process.

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SYMMETRIC DYNAMIC DERIVATIVES FOR QUAD REMESHING OF SIMPLICIAL SURFACES

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Abstract

In this study, we introduce concepts from time scale calculus emerging discrete differential geometry and an algorithm for quadrilateral surface parametrization. This algorithm converts simplicial surfaces to a global quad-parametrization. The discrete integrability of time scale operators defined in symmetric sense may serve an example to increase reliability along the geometry processing.

Keywords: Time scale calculus, Discrete normal fields, geometry processing

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CLASSIFICATION OF CAMERA TRAP DATA USING CONVOLUTIONAL NEURAL NETWORKS

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Abstract

Camera trap data which is a lot of and big data is considered to be important an inventory method. In this study; In order to develop an alternative method, 353 camera trap data including Brown bear (*Ursus arctos*), Eurasian lynx (*Lynx lynx*), Gray wolf (*Canis lupus*), European hare (*Lepus europaeus*), and Wild goat (*Capra aegagrus*) species were classified using ResNet-18 architecture, which is one of the convolutional neural network models. These data are primarily organized according to the 224x224 resolution size. ResNet ESA architecture was used as a method; It was trained on the ImageNet dataset and achieved a 3.57% error rate, ranking first in the classification success of the ILSVRC-2015 competition with this success rate. Pre-trained ResNet-18 architecture is used as standard ESA. The model was built using the Python programming language and the fast.ai library was used for training and testing the model. In the model, 80% of the data is randomly allocated for training and 20% for testing. The batch_size parameter for the input data is set to 64 and the epoch value used in the model is set to 50. The performance criteria of the model, precision, sensitivity, and f1 score, were obtained as 0.76, 0.75, and 0.75, respectively. As a result of the analysis, the accuracy value of the success of separating the species in the camera trap images was determined as 0.75. Although this success is not at the desired level, it is an important result for camera traps with this method. When examining which camera trap images cannot be separated as a result of the test, more image processing, and image quality come to the fore. Although the method has shortcomings, the results are of great importance in terms of being a good alternative for camera trap data processing problems.

Keywords: Wildlife Animals; Machine Learning; Data Management.

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Taxonomic Diversity Calculation in Woody Species: Example of Dedegöl Mountain

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Abstract

Biodiversity includes all species living in a habitat, all genotypic and phenotypic variations within each species, and all spatial and temporal variability in the communities and ecosystems of those species. Taxonomic diversity, which is one of the important parts of biological diversity, allows interpretation by considering the kinship status of species and obtaining information about ecosystem functioning. However, today, there are very few studies evaluating the taxonomic characteristics of species. This study was carried out to determine the taxonomic diversity of woody species in the Dedegöl Mountain region in order to set an example for the studies to be carried out within the scope of taxonomic diversity.

In the study, the data of 48 woody plant species taken from 103 sample areas were used. The new taxonomic diversity index (pTO) based on Deng Entropy, proposed by Özkan (2018), was used to determine the taxonomic diversity in the region. According to the taxonomic diversity values calculated with pTO, the highest taxonomic diversity in the Dedegöl Mountain region was determined in the 39th sample plot, which contains 18 different woody plant species and is located at an altitude of 1367 meters. While Shannon diversity index was determined as 2,60 in the subject area, weighted taxonomic diversity measurement value (TO) 15,28, unweighted taxonomic diversity measurement value (uTO) 10,495, weighted taxonomic distance measurement value (TO^{+}) 15,68, unweighted the taxonomic distance measurement value was calculated as (uTO^{+}) 10,895. When the results obtained in the study are examined in detail, as the altitude of the area increases, the species diversity decreases, while the taxonomic diversity and taxonomic distance values increase.

Keywords: Biodiversity; Shannon Diversity Index; Deng Entropy

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ON THE COMPLEX CHARACTERISTICS INTO THE LONG JOSEPHSON JUNCTION MODEL

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Abstract We investigate the perturbed sine-Gordon equation. We determine the coefficients for the test function of solution formula given by a powerful scheme. The governing perturbation model is used to symbolize the long Josephson junction which is separated by two superconductors.

Keywords: Nonlinear perturbed sine-Gordon equation, Complex travelling wave solutions, Singularly perturbed results.

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TEXTURE SPACE ASSOCIATED WITH GRAPHS

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Abstract

In this paper, texture graphs are defined as associated with graphs and ditopologies. Also, some properties of texture graphs are investigated.

Keywords: Texture space, ditopology, graph.

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A STUDY ON THE GENERALIZATION OF SOME SIGMOIDAL GROWTH MODELS

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Abstract

In this study, the generalization to some sigmoidal growth models is given in detail. For this purpose, the generalized transformation values and relations of the models are presented with a flow chart. It is stated that the models used are the solutions of the velocity-state differential equations. Their solutions are examined.

Keywords: Sigmoidal Growth Models; Koya-Goshu Growth Model

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GRAPH STRUCTURE OF A SPECIAL CONGRUENCE SUBGROUP OF THE EXTENDED MODULAR GROUP

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Abstract

In this paper, firstly we define the congruence subgroup $\widehat{\Lambda}_n(N)$, i.e.

$$\widehat{\Lambda}_n(N) := \langle \Lambda_n(N), R(z) \rangle = \Lambda_n(N) \cup R\, \Lambda_n(N).$$

It is obtained by the expanding the

$$\Lambda_n(N) := \{ \begin{pmatrix} a & b \\ c & d \end{pmatrix} \in \Gamma_0(N):\ a^2 \equiv d^2 \mod N, N \in \mathbb{Z}^+, n|N \}$$

congruence subgroup with the reflection $R(z) = -\bar{z}$. Secondly, we research the graph structure of the congruence subgroup $\widehat{\Lambda}_n(N)$ on $\widehat{\mathbb{Q}}_n(N)$,

$$\widehat{\mathbb{Q}}_n(N) := \{ \frac{a}{cN} \in \widehat{\mathbb{Q}} : (a, cN) = 1 \ \ and \ \ a^4 \equiv 1 \mod n \}.$$

Later on, we establish edge condition and be a triangle at the suborbital graphs $\hat{F}_{u,n,N}$. These suborbital graphs are on the set $\widehat{\mathbb{Q}}_n(N)$ of the group $\widehat{\Lambda}_n(N)$. And finally, we have state and prove under what conditions the suborbital graph $\hat{F}_{u,p,N}$ is a forest for $\widehat{\Lambda}_p(N)$ on $\widehat{\mathbb{Q}}_n(N)$. Here p is a prime number.

Keywords: Extended modular group; Congruence subgroup; Edge condition; Triangle, Forest.

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Optical solitons to the generalized higher-order nonlinear Schrodinger equation arising in optical fibers

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Abstract

The optical solitons for the higher order nonlinear Schrodinger equation (NLSE) are established in this study. To construct such novel solutions, we employ robust integration technique called extended rational sinh-cosh. The novel soliton control structure has been studied in order to explain specific physical problems. These findings have been used for the transmission of long-wave and high-power telecommunication networks, which has proven to be beneficial. The circumstances required for the existence of these solitons are presented. Keywords: higher order Schrodinger equation; extended rational sinh-cosh; 'nonlinearity, optical solitons.

Keywords: Higher order Schrodinger equation; extended rational sinh-cosh; 'nonlinearity, optical solitons

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CALCULATING AND MAPPING OF TOPOGRAPHIC COMPLEXITY USING ENTROPY EQUATIONS

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Abstract

In applied ecology, environmental factors have been frequently used for distribution modelling of biodiversity. However, the complexities or heterogeneities of those factors have been almost completely ignored. The present study draws attention to this issue. We conducted a study to explain and illustrate how to prepare complexity maps of elevation, radiation index, and slope degree using the data from Burdur Lake watershed, Turkey. In the present study, firstly, large grid sizes of 750x750 meters were formed throughout the watershed. Each grid was divided equally into 36 units with the size of 125x125 meters. Next, for each grid, Shannon Entropy, Rao's Quadratic Entropy, Simpson Index, and Gray Level Co-occurrence Matrix (GLCM) algorithms were calculated for each topographic feature. Lastly, the calculated complexity values were visualized. Thus complexity maps of the topographic features were created for the Burdur Lake watershed.

Keywords: Environmental heterogeneity; Habitat heterogeneity; Landscape diversity; Species diversity; Topographical variability.

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Dynamic behavior of the Fokas system arising in monomode optical fibers through the unified auxiliary equation method

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Abstract

In this study, we investigate the Fokas system which represents the spread of irregular pulse in monomode optical fibers by using the unified auxiliary equation method, which is the most powerful method for exploring exact solutions for nonlinear models. The wave transform is used in order to convert a partial differential equation into an ordinary differential equation. As a result, several distinct solutions are obtained such as dark, bright, dark–bright, singular, Jacobi elliptic function, and exponential solutions. Furthermore, 3D surfaces and 2D graphics for the obtained solutions are drawn by choosing appropriate values for the involved free parameters. particular values to the parameters involved.

Keywords: Fokas system; the unified auxiliary equation method; Exact solutions.

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*Abstract Submission should be prepared only **1 page**.

A class of solutions for the Boussinesq-like equations including Spatio-temporal dispersion

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Abstract

The Boussinesq equation is a very famous nonlinear evolution equation developed for describing the motion of water with small amplitude and long wave. Boussinesq-type equations which also include dispersion, time dependence and weak nonlinearity have become the most important equation in the prediction of wave transformations in coastal areas. In this study, the $\left(m+\frac{1}{G'}\right)$-expansion method is presented. By using this method, we compute the exact solutions of the Boussinesq-like equations including Spatio-temporal dispersion. As a result of calculations travelling wave solutions are obtained. The graphs of these solutions are drawn and analyzed.

Keywords: $m+\frac{1}{G'(\xi)}$ method; Boussinesq equation; Travelling wave solution.

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OPINIONS OF PRE-SERVICE SCIENCE TEACHERS ABOUT VIRTUAL TOURS TO SCIENCE CENTERS

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Abstract

Science centers are defined as places that offer experimental and hands-on activities for individuals of different age levels, and that make science and technology understandable and accessible (1). Due to reasons such as the lack of science centers in every province in Turkey and the cost of visits, science centers can be reached through virtual tours. In this study, it is aimed to examine the views of pre-service science teachers about their virtual tours to science centers. The sample of the research consists of 6 pre-service teachers studying in the 3rd grade of the Science Teaching undergraduate program of the Faculty of Education of Ordu University. This research was carried out the case study method. In the research, semi-structured interview form and two worksheets were used as data collection tools. The findings obtained in this interview were interpreted through descriptive analysis. According to the results of the analysis of the findings obtained from the interview data, pre-service science teachers define science centers as the means that provide scientific information and technology. At the same time, they think of science centers as areas prepared to conduct experiments and reveal new ideas. Pre-service science teachers define virtual tour to science centers as reaching physical areas in virtual environment. In these virtual tours, besides visiting the areas, they expect to make discoveries by interacting with the areas. However, it has been revealed that pre-service science teachers do not have knowledge about science centers in their own countries. In our study, pre-service science teachers were provided to get to know Konya Science Center through virtual tours. During the virtual tour were made applications. In these applications, activities that pre-service science teachers can use in their professional lives are included. It is thought that virtual tours will contribute to the professional development of pre-service science teacher.

Keywords: Science centers; Virtual tour; Pre-service science teacher.

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ON SOLUTION OF THE NON-NEWTONIAN VOLTERRA INTEGRAL EQUATIONS WITH CONVOLUTION KERNEL

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Abstract

The non-Newtonian calculus, which has many field of application such as interest rates, theory of elasticity in the economy, the viscosity of the blood, computer science including image processing and artificial intelligence, biology, differential equations, functional analysis and probability theory, was built as an infinite family of calculus consisting of the branches of geometric, bigeometric, harmonic, biharmonic, quadratic and biquadratic calculus by Grossman and Katz [1]. In this study, the Volttera integral equations with convolution kernel are defined in the non-Newtonian calculus with the aid of $*$-integral. The focus of this study is obtained the exact solutions of the convolution type linear non-Newtonian Volterra integral equations of the first kind and also the second kind by using non-Newtonian Laplace transform.

Keywords: Non-Newtonian calculus; Volterra integral equations; Integral transforms.

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A STUDY ON CONJUGATE CONNECTIONS ON PARA ANTI-HERMITIAN MANIFOLDS

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Abstract

Let ∇ be a linear connection on an almost para anti-Hermitian manifold M_{2n}, equipped with an almost para complex structure φ and a pseudo-Riemannian metric g. Also, associated para anti-Hermitian metric of almost para anti-Hermitian manifold is defined by $G(X,Y) = (g \circ \varphi)(X,Y)$ and called twin para anti-Hermitian metric of g. In this study, we introduce three types of conjugate connections of linear connections relative to g, φ, G and investigate some properties of these conjugate connections.

Keywords: Conjugate Connections; para anti-Hermitian Manifolds.

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THE EXPLOSION OF THE SOLUTIONS OF STOCHASTIC WAVE EQUATIONS

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Abstract

In this study, a class of nonlinear stochastic wave equations is considered. Using appropriate energy inequalities, some sufficient conditions are established for the local solutions of the stochastic wave equation to blow-up with positive probability. Under these conditions, it is examined whether the solution of the equation in question exists in finite and infinite time. As a result, it has been determined that the solution of the equation approaches infinity as the variable approaches a finite time.

Keywords: Blow-up, Global solution, Local solution, Stochastic wave equation.

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ESTIMATING SAMPLE COMPLETENESS FOR BIODIVERSITY ASSESSMENT BASED ON TREE AND SHRUB SPECIES IN SARIKAYA WLDA/ANTALYA

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Abstract

We carried out a study to test sample completeness in Sarıkaya Wildlife Development Area (WLDA), one of the most important biodiversity hotspots in Turkey. The data used consists of 103 tree and shrub species collected from 104 sampling plots. To test sample completeness, we used five methods, Chao 2 $(\hat{S}_{Chao2})$, adjusted Chao 2 $(\hat{S}_{iChao2})$, Jacknife 1 $(\hat{S}_{jk1})$, Jacknife 2 $(\hat{S}_{jk2})$, boostrap $(\hat{S}_{boot})$ and expected species richness based on the number of only once seen species $(\hat{S}_{Q_1})$.

The results indicated that the lowest estimated richness values were provided by $\hat{S}_{Chao2}$, $\hat{S}_{iChao2}$ with 113 and 115 species, respectively. The highest estimated richness corresponds to the values of 123, 122 and 121 obtained by $\hat{S}_{jk2}$, $\hat{S}_{Q_1}$ and $\hat{S}_{jk1}$ while the value of $\hat{S}_{boot}$ is equal to 112. According to average values of the estimators, estimated sample completeness corresponds to a value of 87.5% with the confidential intervals between 85% and 90.2%. This relative value provides sufficient information to examine vegetation-environmental relationships or ecological land classification because woody species have been generally used for such studies as explanatory data. However, for biodiversity studies, not only woody species but also herb species are considered. Hence, we concluded that field work needs to continue to grand sufficient data collection by taking extra sampling plots in the study area.

Keywords: true species richness, sample coverage, negative bias, bio complexity, bias-corrected estimators

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LMI-BASED STABILITY ANALYSIS OF NONLINEAR SYSTEMS WITH TWO ADDITIVE TIME-VARYING DELAY COMPONENTS

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Abstract. This study is concerned with the LMI-based stability analysis of nonlinear systems with two additive time-varying delay components in Lyapunov–Krasovskii framework. By constructing a suitable augmented Lyapunov-Krasovskii functional (LKF) with integral terms, some new stability criteria are established in terms of linear matrix inequalities (LMIs), which are easily tested by various convex optimization techniques. More information of the lower and upper delay bounds of time-varying delays are used to obtain the stability criteria, which can lead less conservative results. In this direction, this study presents a new stability analysis result for a class of nonlinear systems with two additive time delays. Finally, two numerical examples are given to demonstrate the effectiveness and to show the applicability of the proposed method over existing results by using the MATLAB-Simulink.

Keywords: LKF, Stability, Additive time delay, LMI.

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The potential distribution of *Teucrium chamaedrys* L. in Turkey

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Abstract

Teucrium chamaedrys L. is a plant species evaluated as an evergreen and non-wood forest product. It has been used in the treatment of diseases such as hypertension, gout, diabetes and obesity from past to present. Because of these properties, it has been consumed in herbal tea and capsule form since the 1980s. It is aimed to determine the potential distribution of *Teucrium chamaedrys* L. species depending on environmental factors in Turkey, which contributes to the economy of Turkey due to its medicinal and aromatic plant properties. For this purpose, present data records of *Teucrium chamaedrys* L. species in Turkey were downloaded from the Global Biodiversity Information Facility (www.gbif.org). Then, the 63 present data of the target species were associated with the independent variables using the Maximum entropy method and the potential distribution map of the species in Turkey was obtained.

Keywords: Maximum entropy method; Medicinal and Aromatic plants; Modeling and mapping; Plant species distribution.

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Approximation by a new construction of parametric Baskakov operators

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Abstract

In the present study, we introduce a non-negative real parametric generalization of Baskakov operators and call them α-Baskakov operators whose construction depends on a real-valued function τ by using two sequences u_n and v_n of functions. We prove that the new operators provide a weighted uniform approximation on $[0,\infty)$. In terms of weighted moduli of smoothness, we obtain degrees of approximation associated with the function τ. Also, we prove the Voronovskaya-type theorem.

Keywords: Baskakov, approximation, parametric, sequence

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To Alternate the Routes Encoded by Bloom Filters in Computer Networks Represented by Graphs

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Abstract

Compressing the data to take up less space can be considered as a solution for the reliability of data exchange between computers in computer network systems, communication speed between computers, the data traffic in the network or the limited storage areas in the computers for the big data . There may be many other solutions to be produced for the problems can be faced during routing in computer networks, as well as the use of the Bloom filter is one of them. The Bloom filter is a construct used to represent a set in compressed form [1]. However, it has potential to produce errors denoted by false positives with a probability. In order to produce mathematical solutions to real-time network problems such as network attacks or physical disruptions during message transportation or communication between computers in networks, a computer network system model can be represented by a mathematical graph and the edges of the graph are represented by Bloom filters. We aim to evaluate the probability of false positives that may be encountered during message transmission in the computer network system and possible physical deterioration situations that may occur on the edges of the graph, and accordingly we present the most appropriate and reliable transmission paths. With some assumptions (such as the graph is known, the risk situations of the roads are known, and whether the paths are the shortest path between two given points), We aim to obtain a model that presents the alternative routes to the users in an undirected network systems.

Keywords: Computer Network; Bloom filter; False positives.

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Time Optimal Trajectory Generation in Joint Space for 6R Industrial Serial Robots Using Cuckoo Search Algorithm

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Abstract

In this paper, an optimal trajectory planning approach is proposed based on optimal time by utilizing the interpolation spline method. The method including a combination of cubic spline and 7th order polynomial is used for generating the trajectory in joint space for robot manipulators. Cuckoo Search (CS) optimization algorithm is chosen to optimize the joint trajectories based on objective, namely minimizing total travelling time along the whole trajectory. The spline method has been applied on PUMA robot for optimizing the joint trajectories with the CS algorithm based on objective. Moreover, results from the proposed algorithm have been compared with that of the algorithms suggested by earlier studies. With the trajectory planning method, the joint velocities, accelerations and jerks along the whole trajectory optimized by CS meet the requirements of the kinematic constraints in case of objective. Simulation results validated that the used trajectory planning method based on the proposed algorithm are very effective in comparison with the same methods based on the algorithms proposed by earlier authors.

Keywords: Trajectory planning, Interpolation spline methods, Industrial robots, CS.

Call Assistant Application for Call Centers

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Abstract

In this study, we develop a new application to handle incoming calls into call centers when the centers are on holiday, non-working time, or peak call time. Previously, we were using a Voicemail server from Avaya by license. To reduce side effects like overloading and high currency cost, we made a definition between Interactive Voice Response (IVR) and Central. With this definition, the load of the server is reduced significantly. Then, we developed an intermediate application that would forward the incoming calls from the exchange to the server for recording incoming calls on the IVR side. Incoming Voicemail will be directed to the IVR according to the determined conditions, and the customer's speech will be translated into the written text over IVR. Afterward, these texts will be sent by email to the authorized people within the defined projects. This mail will contain the voice file and information of the person who sent this Voicemail. Afterward, the authorized person who receives this email will respond to this request within his own team.

Keywords: Voicemail; Callback Requests; Abandon Calls; Interactive Voice Response

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AN APPLICATION ON THE EXTENDED TECHNOLOGY ACCEPTANCE MODEL

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The effective use of technology in education, which affects every aspect of life in the age we live in, has an important place. It is of great importance to determine the factors affecting the use of technology in education and training. In this study, data analyzes were performed using IBM SPSS 22 and AMOS V24 programs. In this process, some results were obtained by using various statistical techniques such as structural equation modeling (SEM), multivariate statistical techniques (Confirmatory Factor Analysis (CFA) and bootstrap) and descriptive statistics. As a result of the analysis, it was determined that perceived ease of use, attitude towards use and perceived usefulness had positive effects on behavioral intention and results similar to the literature were obtained.

Keywords: Technology Acceptance Model, Structural Equation Model, Multivariate Statistical Techniques.

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NEW OPERATION TYPES ON INTERVAL-VALUED NEUTROSOPHIC SOFT SETS

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Abstract

In this paper, we introduce the notion of interval-valued neutrosophic soft set which is a generalization of neutrosophic soft sets. Then we define some new operations on interval-valued neutrosophic soft sets and investigate basic properties related this operations. We also present numerical examples for better understanding of the subject.

Keywords: Interval-valued set; Neutrosophic set; Interval-valued neutrosophic set.

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A NEW VIEW ON INTUITIONISTIC FUZZY SOFT GRAPHS

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Abstract

In this paper, we study a novel framework for handling intuitionistic fuzzy soft information by combining the theory of intuitionistic fuzzy soft sets with graphs. We give renewed notions on the structure of intuitionistic fuzzy soft graph. We also introduce concept of ifs-complemet of an intuitionistic fuzzy soft graph and investigate some properties of it.

Keywords: Intuitionistic fuzzy soft set; Graph; Intuitionistic fuzzy soft graph.

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A Study on the Solutions of (1+1)-Dimensional Mikhailov-Novikov-Wang Equation

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Abstract

The main purpose of this study is to obtain various solutions of the (1+1) dimensional Mikhailov-Novikov-Wang integrable equation. For this purpose, the generalized exponential rational function method has been applied to this equation. Thus, some trigonometric function, hyperbolic function and bright soliton solutions of the studied equation were obtained. In addition, 2D and 3D graphics of the obtained solutions were drawn for certain values. The obtained results and the graphic drawings of the results were made using Wolfram Mathematica 12.

Keywords: Generalized exponential rational function method; (1+1)-dimensional Mikhailov-Novikov-Wang integrable equation.

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ON STATISTICAL CONVERGENCE OF GENERALIZED FUZZY NUMBER SEQUENCES

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Abstract Fuzzy set theory was first studied by Zadeh[7]. This theory has been applied to many different fields of science. Fuzzy number sequences play an important role in mathematical analysis and functional analysis. In this study, we analyzed some inclusion theorems by defining a new statistical convergent fuzzy sequence space using Δ_p^m −difference sequence.

Keywords: Statistical Convergence, Fuzzy Sequence.

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Stability and bifurcation analysis of a fractional order population model with piecewise constant arguments

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Abstract

The present study deals with the analysis of a a conformable fractional order population model. Using the method of reduction to discrete equations, it is obtained a system of difference equations from the model. In order to get local and global stability conditions of the positive equilibrium point of the system, we use Schur-Cohn criterions. By using the center manifold theorem and the bifurcation theory, it is shown that the discrete dynamical system undergoes Neimark–Sacker bifurcation. On the other hand, bifurcation occurring in the discrete system is controlled using the OGY method, hybrid control method and exponential type chaos control strategy. The bifurcation diagrams, phase portraits and Lyapunov exponents are obtained for the discrete model.

Keywords: Conformable fractional derivative; Discretization; Stability; Neimark-Sacker bifurcation; Chaos control.

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APPROXIMATION PROPERTIES OF A NEW TYPE OF GAMMA OPERATOR

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Abstract

In this paper, a new type of Gamma operator will be presented. The approximation properties of the presented operator are tested on the Voronovskaya type theorem, weighted approximation. The rate of convergence was found and pointwise estimation was examined. Numerical example is given to show that the last newly defined operator approaches the function faster.

Keywords: Gamma function; voronovskaya type theorem; weighted approximation; rate of convergence; pointwise estimates.

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On metrizability of topological groups

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Abstract

In this paper, we are going to discuss about the following facts and when a topological space equipped with an algebraic structure, for instance group structure, how can one reduce the assumptions given in the facts.

Fact 1. If X is a regular, locally separable, meta-Lindelöf, $w\Delta$-space with a $G_\delta-$diagonal, then X is metrizable.

Remember that a topological space X is called G_δ-diagonal if $\{(x,x): x \in X\}$ is a G_δ subset of $X \times X$, that is it is as intersection of a family of open subsets of $X \times X$. Also the topological space X is said to be metacompact (paracompact) if each open cover U of X has an open refinement SS such that each $x \in X$ is an element of only finitely many elements of SS; SS is said to be a point-finite refinement of U. X is said to be para-Lindelöf (meta-Lindelöf) if each open cover U of X has an open refinement SS such that each $x \in X$ has a neighbourhood which intersects only countably many elements of $x \in X$.

Fact 2. A regular metacompact M$-$space X is metrizable if and only if it has a G_δ .

Fact 3. Regular space X with a uniform base is metrizable if and only if it is an $M-$space.

Fact 4. If X is a regular, locally countably compact, metacompact space with a G_δ-diagonal , then X is metrizable and locally compact.

Keywords: Regular, locally separable, metacompact, topological group

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A COMBINED FINITE DIFFERENCE-COLLOCATION METHOD FOR FITZHUGH-NAGUMO EQUATION

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Abstract

In this study, we propose a numerical method to solve Fitzhugh–Nagumo equation which is an important partial differential equation in biology. The proposed numerical method uses finite difference method for time discretization of the equation. For space discretization Fibonacci and Lucas polynomials are used. Two problems are solved numerically. Acquired numerical solutions are compared with exact solutions and with methods available in literature. The comparsions indicate efficiency of the proposed method.

Keywords: Lucas polynomials; Partial differential equations; Computational method.

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Nonlinear differential equations with according to the Darboux frame

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Abstract

In the current study, we define k-type slant helices of timelike curves in Euclidean 4-space consisting of Darboux vector. Also, we characterize k-type slant helices in terms of their curvatures. On the other hand, nonlinear differantial equations are obtained by utilizing k-type slant helices.

Keywords: Nonlinear differential equations; Curve; Darboux frame.

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Potential distribution modeling of *Styrax officinalis* L. in Mediterranean ecosystems

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Abstract

For accurate ecosystem-based management plans and strategies today and in the future, it is necessary for modeling and mapping of ecological characteristics of target species. In the present study, data from Kumluca district representing the Mediterranean ecosystem of Turkey were analyzed using two different modeling techniques to determine the potential distribution of *Styrax officinalis* L. According to the results of Logistic Regression Analysis (LRA), which is the first of the modeling techniques, precipitation, elevation, radiation index, heat index, solar radiation index, and topographic humidity index were the significant explanatory variables for the potential distribution of the species. The ROC values of the training and test dataset of the LRA model were found 0.915 and 0.874, respectively. Elevation, precipitation, and hillshade index were the variables that structured the model in the Classification Tree (CT) technique as the second method. The ROC values of the training and test dataset of the CT model were found 0.937 and 0.834, respectively. The common results of the two models revealed that the distribution of the species in Mediterranean ecosystems above 1500 m is generally limited. Below 1500 m, mainly precipitation and partially other model variables were statistically significant descriptors for the potential distribution areas of S. *officinalis* in the district.

Keywords: Classification tree; Ecological factors; Lojistic Regression Analysis; Precipitation

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On the Numerical Solutions of time Fractional FitzHugh Nagumo equation with Forced Term

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Abstract

Neuronal behavior in terms of membrane potentials are modeled using some partial differential equations such as Hodgkin-Huxley model (1952), FitzHugh-Nagumo model (1969), Morris-Lecar model (1981), Hindmarsh-Rose model (1984). Among these models, FitzHugh-Nagumo model due to its mathematically simple nature and producing a rich dynamical behavior, has been so successful. The aim of this paper is two fold: firstly, to construct a finite element scheme to investigate the underlying fractional numerical behaviour the time fractional FitzHugh model with forced term and Robin boundary conditions. To support these numerical and theoretical observations, numerical example for the model and graphical behavior of the solutions are presented under the proposed fractional framework. Results indicate that the proposed method are very effective mathematical tools for solving reaction--diffusion systems.

Keywords: FitzHugh-Nagumo model, Collocation method, B-splines.

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The Köthe Teoplitz Duals of $V_\lambda^0(G)$

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Abstract

In this paper, we define the sequence spaces $V_\lambda^0(G)$, where $G = (g_k)$ is a sequence of modülüs functions. Also we will show that this space is a linear space and a solid AK-FK-space with an absolutely monotone F-norm. Furthermore we will introduce the The Köthe-Toeplitz Duals of $V_\lambda^0(G)$.

Keywords: Köthe-Toeplitz duals; AK-FK-spaces; Modülüs functions; Summability.

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APPLICATIONS OF COMPLEX FUZZY SOFT SETS IN RING THEORY

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Abstract

In this paper, we extend the notion of ring to inside the algebraic structures of complex fuzzy soft sets. Then we introduce the concept of complex fuzzy soft rings (ideals) and study some of their properties and structural characteristics. We also give some theorems of homomorphic image and homomorphic pre-image of complex fuzzy soft rings under a complex fuzzy soft homomorphism.

Keywords: Complex fuzzy soft set; Complex fuzzy soft ring; Complex fuzzy soft ideal.

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On the complex solutions to the Hirota–Satsuma–Ito equation

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Abstract

In this work, we study the Hirota–Satsuma–Ito equation that describes the propagation of unidirectional shallow-water waves and interactions of two long waves with different dispersion forms. For this study, we use the sine-Gordon expansion method for the suggested equation. Complex solutions in terms of dark-bright, dark and bright are constructed. Obtained solutions are constructed in three-dimensional figures to understand these physical phenomena.

Keywords: Complex solutions, Hirota–Satsuma–Ito equation, Dark, Bright, Dark-bright.

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A SECOND-ORDER DİFFERENCE SCHEME ON BAKHVALOV MESH FOR THE SİNGULARLY PERTURBED DELAY PSEUDO-PARABOLİC EQUATİONS

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Abstract

This paper presents the finite difference scheme on Bakhvalov mesh for the singularly perturbed pseudo-parabolic problems with time-delay. Priori bounds of the solution is investigated by using the energy estimates. An error analysis is derived in the discrete maximum norm and the almost second order convergence is obtained. A numerical example is included to confirm the theoretical findings.

Keywords: Delay differential equation, difference scheme, error estimate, pseudo-parabolic problem, singular perturbation

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A ROBUST NUMERİCAL METHOD FOR THE SİNGULARLY PERTURBED SECOND-ORDER VOLTERRA-FREDHOLM INTEGRO-DİFFERENTİAL EQUATİONS

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Abstract

In this study, second-order Volterra-Fredholm integro-differential equations with layer behavior is investigated. Firstly, preliminary results for the analytical problem are given. Then, a uniform discretization is presented on layer-adapted mesh. The stability and convergence bounds of the proposed discretization are analyzed in the discrete maximum norm. Finally, numerical examples are given to clarify the theory.

Keywords: Error estimate, Finite difference scheme, Layer-adapted mesh, Singular perturbation.

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AN APPLICATION OF INTUITIONISTIC NEUTROSOPHIC SOFT GRAPHS IN A DECISION-MAKING PROBLEM

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Abstract

We encounter countless decision-making problems in our daily lives. With the progress of science, many problems have progressed at the same speed. The universal language of science that produces solutions to such problems is mathematics. In order to find the most accurate solution, the way of thinking that leads us to the right decision is mathematical modeling. In this paper, firstly we introduce the concept of intuitionistic neutrosophic soft graphs and give some new operations on this concept. Further, we discuss a real-life application of intuitionistic neutrosophic soft graphs in decision-making. Lastly, for the selection of optimal object, we elaborate general procedure of our application by designing an algorithm.

Keywords: Intuitionistic neutrosophic soft set; Intuitionistic neutrosophic soft graph; Decision making problem.

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AN ALGORITHM FOR THE VERTICES ON THE PATHS OF MINIMAL LENGTH IN THE SUBORBITAL GRAPHS

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Abstract

The suborbital graphs are formed by the imprimitive action of the modular group Γ on the rational projective line $\widetilde{\mathbb{Q}} = \mathbb{Q} \cup \{\infty\}$. Jones, Singerman and Wicks extend the results of Farey graph $\mathbf{F}_{1,1}$ to suborbital graphs $\mathbf{F}_{u,N}$, where $(u, N) = 1$ and $N > 1$. Then, Deger defined the farthest vertices on the paths of minimal length on the suborbital graphs and investigated the related continued fractions.

In this paper, we present an algorithm which gives the values of the vertices on the paths of minimal length in the suborbital graphs $\mathbf{F}_{u,N}$.

Keywords: Suborbital graphs, Imprimitive action, Continued fractions

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Solitary Wave Solutions to NLEEs for Higher Balance Number through the Modified Simple Equation Method

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Abstract: Although the modified simple equation (MSE) method effectively provides exact traveling wave solutions to nonlinear evolution equations (NLEEs) that emerge in engineering and mathematical physics, it has some drawbacks. When the balance number is greater than one, the approach typically fails to provide solution. We have addressed this shortcoming in this article and figured out a process to implement the MSE approach to investigate NLEEs for balancing number two. Two NLEEs, namely, the regularized long wave and the Jimbo-Miwa equations, have been investigated in order to affirm the approach. Through this scheme, we found further generic wave solutions related to physical parameters, and when the parameters receive particular values, solitons emerge from the exact solutions. Graphs are used to investigate the solitary wave properties of the attained solutions. This shows the validity, usefulness, and compatibility of the process.

Keywords: MSE method; nonlinear evolution equations; solitary wave solutions; exact solutions; regularized long wave equation; Jimbo Miwa equation

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New exact solutions for the Ivancevic option pricing model

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Abstract

The Ivancevic option pricing model is presented by the application of the improved Bernoulli subequation function method. The equation which is a nonlinear partial differential equation is transformed into nonlinear ordinary differential equation using a wave transformation and then is solved by IBSEFM. Some new solutions are successfully constructed. Under suitable choice of the parameter values, interesting two- and three-dimensional graphs of all the obtained solutions are plotted.

Keywords: The Ivancevic option pricing model; the improved Bernoulli subequation function method; Exact solutions.

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On the partial (p,q)-differential equations

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Abstract

The quantum calculus (or recalled q-calculus) appeared as a connection between mathematics and physics. It has many applications in different mathematical areas, such as number theory, combinatorics, orthogonal polynomials, and other sciences: quantum theory, mechanics, and theory of relativity. Further, there is the possibility of extension of the q-calculus to post-quantum calculus denoted by the (p,q)-calculus. When the case $p=1$, the (p,q)-calculus reduces to the q-calculus. Recently, Jafari et al. (Rom. Journ. Phys. 59, 399-407, 2014) presented the reduced q-differential transform method for solving partial q-differential equations. In this study, we define the concept of partial (p,q)-derivative for a multivariable function and generalize the method of Jafari et al. to partial (p,q)-differential equations. Also, we give some examples to discover the effectiveness and performance of the proposed method.

Keywords: q-calculus; (p,q)-calculus; Partial differential equation; Initial value problem.

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Some special Smarandache Ruled Surfaces according to Frenet Frame in E^3-II

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Abstract.
In this study, firstly, the Smarandache curve was defined using Frenet vectors of a curve. Along this curve, the Gaussian and average curvatures of the ruled surfaces formed by the vectors obtained from the Frenet vectors are calculated, and the conditions of being openable or minimal are given. Finally, examples were given for each surface and drawings were made with the maple 17 program.

Key Words: Smarandache ruled surfaces, mean curvature, Gaussian curvature,vivian cuve

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PELL AND PELL-LUCAS NUMBERS IN SUBORBITAL GRAPHS

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Abstract

Continued fractions and their matrix connections have been used in many studies to generate new identities. On the other hand, many examinations have been made in the suborbital graphs under circuit and forest conditions. Special number sequences and special vertex values of minimal length paths in suborbital graphs have been associated in our previous studies. In this study, some special natural number values of $k > 2$ are used for the continued fractions $\boldsymbol{K}(-1/k)$, which is a special periodic continued fraction. The relation between Pell, Pell- Lucas numbers and the suborbital graphs are examined by using this continued fraction. Also, some new identities and some new matrices related to Pell, and Pell-Lucas number sequences are produced.

Keywords: Pell numbers, Pell-Lucas numbers, Continued fractions, Suborbital graphs

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SOME RELATIONS BETWEEN THE SETS OF $\Delta_v^m(f)$-STATİSTİCAL CONVERGENCE OF ORDER α

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Abstract. In this article we introduce the relationship between $\Delta_v^m(f)$-statistically convergent and $\Delta_v^m(f)$-statistically bounded of order α .

Mathematics subject classification. 40A35 . 40G15 . 40A05 . 46A45

Keywords and phrases. Density . Modulus functıon . Statistical convergence . Statistical boundedness . Difference sequence

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DETERMINING THE SUSTAINABLE CONSUMPTION BEHAVIORS OF TEACHER CANDIDATES

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Abstract

Consumption is defined in the dictionary as the use and consumption of things produced. Consuming is carried out for different purposes, from fulfilling the vital activities of living things to meeting essential needs. It is known that this action is affected by many factors such as age, gender, lifestyle, occupation, and environmental awareness. Obviously, with the unconscious increase in consumption, there will be problems that are difficult to solve in the world. The concept of sustainable consumption has a critical position in this sense. Sustainable consumption behavior is a form of action that aims to make the present and the future livable by ensuring that the consumer mass is conscious while performing the consumption act. For life to be sustainable, it is essential to give the proper social consumption awareness to manage world resources. In raising conscious consumers, the role of teachers is at least as necessary as that of the family. Therefore, this study it is aimed to determine the sustainable consumption behaviors of science and classroom teacher candidates. The study sample, which was carried out with the descriptive survey model from quantitative research, consists of pre-service teachers who continue their education in science and classroom teaching departments at a state university in North Anatolia. The study consists of 154 persons. The "Sustainable Consumption Behaviors Scale developed by Doğan et al. (2015)" was used as a data collection tool. The data analysis was carried out with the SPSS 21.0 package program.

Keywords: Science teacher candidate, Primary school teacher candidate, Quantitative Analysis

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AN EIGENVALUE PROBLEM WITH A SPECTRAL PARAMETER IN BOUNDARY CONDITIONS

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Abstract

In this paper, we improve asymptotic estimates of eigenfunctions for an eigenvalue problem considered by Kerimov and Mamedov (1999) with the spectral parameter in all boundary conditions when the potential function is continuous, also its differentiation exists and is integrable.

Keywords: Eigenvalue problem; Eigenfunctions; Asymptotics.

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A NEW LOOK AT : THE NUMERİCAL SOLUTİON OF THE GENERALİZED BURGERS–HUXLEY EQUATİON

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Abstract

In this study, a new technique for the numerical approximation of the generalized Burgers–Huxley equation is recommended using Strang time splitting technique which divides the problem into two sub-equations suh that each of them transform a system of partial differential equations. After, each partial differential equation is reduced a system of first-order ordinary differential equations using cubic B-spline collocation method for spatial derivatives. Afterwards, the resulting ODEs for time derivatives are solved using the Strang time splitting technique via Runge–Kutta (RK-4) approach. Our aim here is to measure how effective the technique we applied to the generalized Burgers–Huxley equation is. For this, L_∞ error norm has been calculated by choosing small enough to the time step length used by different researchers and the solutions acquired have been compared with the solutions of some researchers in the literature. It can be seen that the technique used is useful and trustworthy and easily applied to other diffusion–reaction equations and said that the obtained scheme is not only simple but also effective and easy in terms of computability.

Keywords: Generalized Burgers–Huxley equation; Cubic B-splines; RK4 approach; Collocation method

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AN INVERSE RECONSTRUCTION PROBLEM

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Abstract

In this paper, a method is proposed in order to calculate the potential function in Sturm-Liouville differential equation in the normal form with Dirichlet boundary conditions by using some sets of partial data. One of these data is defined in this paper as the other is a data that have been studied. To introduce the method, we give some lemmas and theorems. Then, we give numerical results for some test potentials to show the efficiency of the method.

Keywords: Inverse problems involving ordinary differential equations; Boundary eigenvalue problems for ordinary differential equations;

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BIENERGIES FOR SYMPLECTIC REGULAR CURVE WITH SYMPLECTIC FRAME

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Abstract: In this work , we research geometrical interpration involved with the bienergy for symplectic regular curve with symplectic frame.

Keywords: Frenet vectors, Symplectic curve, energy functions.

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SOME NEW ASSOCIATED CURVES OF A NULL AND PSEUDO NULL CURVE IN 4-DIMENSIONAL MINKOWSKI SPACE-TIME

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Abstract: In this paper on curves, we have designated Principal direction and Binormal direction curves of a granted Null curve and Pseudo Null curve by employing integral curves designated 4-dimensional Minkowski Space-time. Besides, give some characterizations of these curves are granted together with the intercourses between the curvatures of each related curve and the situation of Null and Pseudo Null curves to be helical with respect to each other was examinated.

Keywords: Minkowski Space-time, Principal direction curve, Binormal direction curve, Null curve, Pseudo Null curve, slant helix, B_2- slant helix

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BİSECTOR CURVES OF COMFORMABLE CURVES IN $\mathbb{R}^2$

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Abstract: In this study, the bisector curves of two regular comformable curves from C^1-regular parametric category is inspected in $\mathbb{R}^2$. Then, multivariable function which is corresponded to bisector curves of regular comformable curves is calculated. The bisector curves are procured by two different paths. As a result, the equations which are corresponded to bisector curves are obtained in $\mathbb{R}^2$.

Keywords. Bisector curve, Comformable Derivative, Frenet Frame, Bivariate Functions.

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ON THE CHARACTERİZATİONS OF CURVES WİTH MODIFIED ORTHOGONAL FRAME IN EUCLIDEAN 3-SPACE

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Abstract: In this paper, we study $(k, m)-$type slant helices according to the modified orthogonal frame in Euclidean 3-space.

Key Words: Helices, Slant Helices, Euclidean 3-space.

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Novel Numerical solutions of Time fractional Korteweg-de Vries-Burgers Equation

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Abstract

The current paper uses the well-known and efficient numerical technique, known as Finite element method, to carry out numerical solutions of time fractional Korteweg–de Vries–Burgers equation. For the discretization of fractional time derivative, the $L1$ algorithm is applied, and for the spatial discretization Collocation method which is a finite element method to approximate the exact solution with trigonometric Quintic B-spline is used. The numerical results obtained using the method are presented via tables and graphics. The novel results demonstrate the efficiency and reliability of the method.

Keywords: Time Fractional Korteweg–de Vries–Burgers equation, Collocation method; Trigonometric Quintic B-splines.

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ON SOME FIXED POINT THEOREMS IN QUASI-METRIC SPACES AND ITS APPLICATIONS

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Abstract

In this paper we extend the Nieto fixed point results to the asymmetric context and we give some fixed point results in partially ordered quasi-metric spaces. We show that our results can not be weakened. Finally, we give an application of our results to the complexity analysis of algorithms.
Keywords: quasi-metric, bicomplete, partial order, contraction, monotone map, fixed point..

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AN APPLICATION ON EARTHQUAKE DATA UNDER NON-RESPONSE SCHEME IN SAMPLING THEORY

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Abstract

While working on the population, the difficult situation of reaching all units is sometimes even impossible, as well as financial, time, manpower, etc. There are also restrictions. For this reason, the sample that can represent the population is used instead of the population. At this point, the samples are determined with the most appropriate sampling method, an estimation is made for the population parameters (mean, variance, ratio, etc.) by using these samples. The aim is to estimate the population parameter of the study with the most efficient estimator among existing estimators. For this reason, the most efficient estimator is tried to be proposed by using or producing many different methods in the literature. In such studies, it is assumed that all information is obtained for the variable of study (y) and auxiliary variable (x) in the estimators. However, this will not always be the case when considering the situations that may be encountered in daily life. Therefore, with a new approach developed by Hansen and Hurwitz (1946), estimators have started to be proposed by taking into account the non-response situation.

For the purpose of the study, an estimator was proposed in case of non-response in both the variable of study and the auxiliary variable. Theoretical inferences about the proposed estimator are supported by a numerical example. At this stage, the magnitude which are measured as 4 and larger that occurred and depth of the earthquakes in the Aegean Region were handled in the form of the variable of study and auxiliary variable, respectively, and analyzes were made, and the results were discussed in detail.

Keywords: Non-Response Scheme; Efficiency; Exponential Estimator.

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A DIFFERENT APPROACH TO THE ASSESSMENT OF PARTICULATE MATTER (PM10) POLLUTION IN ANKARA

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Abstract

Air pollution is one of the most critical factors affecting the quality of life. Especially, particulate matter (PM) in the air poses a serious threat to human health. These particulates have different sizes. In this study, dust particles (PM10) smaller than 10 micrometers in diameter, which is one of the most harmful pollutants, are studied. The air quality of metropolitan cities should be measured and evaluated frequently, considering the number of people living. For this purpose, there are different stations where air pollution measurements are made in Ankara, the capital city of Turkey. This study aims for Ankara's mean air pollution rate to be calculated by applying the minimum spanning tree (MST) method, with each node representing a station. This ratio makes it possible for Ankara's overall air pollution assessment in terms of PM10.

Keywords: Minimum spanning tree; Air pollution; Particulate matter.

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COMPARISON OF AEGEAN REGION MAXIMUM EARTHQUAKE MAGNITUDES WITH TIME SERIES METHODS

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Abstract

Earthquakes are one of the natural disasters that cause significant damage to people and nature. To reduce this damage, many studies have been carried out on earthquakes. However, earthquakes have a complicated structure to adapt to a model. The developing technology is used for mathematical-based analysis, data mining techniques, and earthquake predictions with artificial neural networks. The Aegean region constitutes one of the crucial areas in Turkey in terms of active tectonics. Considering the AFAD-DDA catalog as the main catalog for this region, the repeated and missing earthquakes in the Tan and KOERI catalogs are arranged. Since the magnitudes of the earthquakes are related to the damages they cause, the maximum earthquake magnitude estimates are obtained for the first time with time-dependent classical and artificial neural network methods and the results are compared.

Keywords: Time series method; artificial neural network methods; earthquake estimates

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q-Difference Operator on $L^2_q(0, +\infty)$

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Abstract

In this research, the minimal and maximal operators defined by q- difference expression are given in the Hilbert space $L^2_q\ (0, +\infty)$. The existence problem of a q^{-1}-normal extension for the minimal operator is mentioned. In addition, the sets of the minimal operator spectrum and the maximal operator spectrum are examined.

Keywords: q -difference operator; Minimal operator; Maximal operator; q -deformed operatör; q -formally normal operatör; Spectrum sets.

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NEW ANALYTICAL APPROACH TO THE GENERALIZED FISHER EQUATION

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Abstract

In this paper, we use an effective method which is the rational sine-Gordon expansion method to present new wave simulations of a governing model. We consider the conformable (1+1)-dimensional Fisher equation which is used to describe interactive relation between diffusion and reaction. Various type solutions such as dark, bright and singular soliton solutions have been obtained. Finally, the physical behaviours of the obtained solutions are shown by 3D, 2D and contour surfaces.

Keywords: Rational sine-Gordon expansion method; the conformable (1+1)-dimensional Fisher equation; travelling wave solutions.

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On Modified Weingarten Parallel Ruled Surface

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Abstract

In this paper, we obtain some new characterization for Weingarten ruled surface according to Modified frame.

Keywords: Modified frame; ruled surface; Weingarten surface.

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*Abstract Submission should be prepared only **1 page**.

OPINIONS OF TEACHER CANDIDATES ON WEB 2.0 TOOLS AND THEIR USAGE IN EDUCATION

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Theconcept of Web 2.0 wasfirstusedbyDarcyDiNucci in 1990. Internet technologies, called Web 2.0 tools, provideeffectivecommunicationandfastandeasyinformationsharing in education, as in manyareas of ourlives. Withthefeatures of thesetools, such as activedatadesign, informationstorage, feedback, andvisual/verbal data presentation, teachersfindtheopportunitytodesign/designactivitiesthatappealtoparticipantsfromallagegroups. Web 2.0 tools, frequentlyused in education, aregroupedaccordingtotheirusageareas; they can be groupedunder nine headings. These; includemindmaps, digitalboards, creatingpostersandcartoons, writingstoriesandbooks, takingnotesandcreatingblogs, creatingtestsandpuzzles, preparingeffectivepresentations, andcreatinginformationpostersandvirtualclassroomapplications. Inthisstudy, whichwasdesignedbased on thisinformation, pre-service scienceteachers' views, whowerestudying at the 2nd, third, and 4th-grade levels at a stateuniversity in North Anatolia about web 2.0 wereexamined. Thesample of thestudyconsists of thirty-threeteachercandidates. A holisticsingledesignstudy, which is one of thequalitativeresearchmethods, wasusedtodeterminepre-service teachers' viewsabout web 2.0 toolsandtheirusage in education. Thequestionnaireconsisting of nine questions, developedby Timur et al. in 2020 andconsisting of open-endedquestions, wasdistributedtothepre-service teacherswhovolunteeredtoparticipate in thestudyvia Google documents. Thecollecteddatawastransferredtothecomputer. Thenames of theteacher-teachercandidateswere not used in thestudy, andtheywerenamed Ö1, Ö2, etc. Thetransferredanswerswerecategorizedbythethematiccodingmethod, andtheappropriateanswersweredmatchedwiththeappropriatethemes. Thefrequencyvalues of thethemeswerecalculatedwiththe MAXQDA program.

Keywords: digital literacy, teacher candidate, internet tools, qualitative analysis.

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SEMI-INVARIANT SUBMANIFOLDS OF GENERALIZED KENMOTSU MANIFOLD ADMITTING A QUARTER SYMMETRIC NON METRIC CONNECTION

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Abstract

In this paper, semi-invariant submanifolds of a generalized Kenmotsu manifold endowed with a quarter symmetric non-metric connection are studied. Necessary and sufficient conditions are given on a submanifold of a generalized Kenmotsu manifold to be semi-invariant submanifold with quarter symmetric non-metric connection. Morever, we studied integrabilities and parallel conditions of the distribution on semi-invariant submanifolds of generalized Kenmotsu manifold with quarter symmetric non-metric connection.

Keywords: Generalized Kenmotsu manifold; semi-invariant submanifold; quarter symmetric non metric connection.

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SEMI-INVARIANT RIEMANNIAN SUBMERSIONS WITH RICCI SOLITON

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Abstract

In this paper, we introduce ricci solitons on semi invariant Riemannian submersions from contact manifold. We investigate any foliation of such a submersion is a Ricci soliton. Moreover, we show Einstein conditions.

Keywords: Riemannian submersion; semi-invariant Riemannian submersion; Ricci soliton.

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ON A HOMOGENEOUS-HETEROGENEOUS REACTIONS WITH NEWTONIAN HEATING IN FLOW OF A THIRD GRADE FLUID

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Abstract: The fundamental goal here is to display and analyze the feature of homogeneous-heterogeneous responses in the MHD flow of third grade liquid over an extending surface. Both magnetic and electric fields are considered. Advanced heat transfer technique (i.e., Newtonian heating) and heat creation/absorption impacts are utilized in the formulation. Homogeneous and heterogeneous responses are considered inside the liquid and at the boundary individually. Approximate convergent solutions are constructed. Impacts of different numbers on the velocity, temperature and concentration fields are examined and scrutinized. Numerical estimations of friction and local Nusselt number are determined. Concentration fields for homogeneous and heterogeneous reaction numbers are found inverse.

Keywords: Newtonian heating; electric and magnetic fields; homogeneous-heterogeneous reactions; third-grade fluid.

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THE EFFECT OF POLYVINYL ALCOHOL FIBER ON THE MECHANICAL PROPERTIES OF HIGH STRENGTH GEOPOLYMER CONCRETES

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Abstract

Today, it is quite common to use conventional Portland cement-based concrete in buildings. Geopolymer concrete has been proposed as an alternative to Portland cement concrete due to the high greenhouse gas effect and the environmental pollution of energy consumption caused by cement consumption. In this study, metakaolin and ground blast furnace slag (GBFS) were preferred as binder materials to increase the early age strength of concrete and not cause loss of strength due to possible porosity in later ages. In addition, due to the high probability of brittle fracture of geopolymer concrete after curing at high temperatures, it aims to cope with these negative properties by using polyvinyl alcohol fibers (PVA) without reducing the flexural, compressive strengths of concrete. In this study, to examine the effect of PVA on the mechanical properties of high strength geopolymer concrete, three mixtures were designed, 0.3% kg/m^3, 0.6 kg/m^3 fiber and did not contain any fibers which were kept in a curing environment at 80 ^{o}C for 10 hours. GBFS and quartz powder vary, with the same weight percentage of metakaolin as the binder in the mixtures. In addition, the aggregate (quartz) and alkali activator contents of the mixtures are the same. The test results showed that the mixture containing 0.6 kg/m^3 PVA reached 136.2 MPa by increasing the compressive strength by 18.77% compared to the without PVA mixture, and reaching 6.03 MPa by increasing the flexural strength by 63.41%. In addition, it has been determined that the use of PVA as a reinforcing element prevents brittle fracture in geopolymer concrete samples. The results showed that PVA could be used as a reinforcement element to prevent the negative behavior of geopolymer concrete, such as high mechanical properties and less energy consumption and prevent its negative behavior, such as a brittle fracture.

Keywords: Geopolymer Concrete, Polyvinylin Alcohol Fiber, High Strength Concrete

MECHANICAL PROPERTIES OF METAKAOLIN BASED GEOPOLYMERS USING WASTE GEOPOLYMER POWDER AND LIME

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Abstract

In this study, geopolymer samples were prepared by using binders such as waste geopolymer powder, lime and metakaolin. Sodium silicate and sodium hydroxide were used for alkali activation. Quartz aggregate was used in the preparation of the samples. Geopolymer samples with waste geopolymer powder, with a weight ratio of 36% in $1m^3$ volume, were prepared at 60 ℃ for 6-8-10 hours of curing. The test results showed that the highest compressive strength of the mixtures was 79 MPa with the increase of the lime ratio in the 8 hour curing period. It was determined that the highest compressive strength was 73 MPa in the samples in which metakaolin was never used and the lime ratio was maximum, the compressive strengths of the samples with 0.05% lime ratio of metakaolin and 0.025% lime ratio of metakaolin and 0.05% lime ratio of metakaolin were 74 and 79 MPa, respectively. In addition, capillary water absorption tests were also carried out on the samples. Capillarity coefficients of geopolymer mixtures are below 0.377 $kg/m^2.min^{0.5.}$ It has been suggested that geopolymer mixtures produced from recycled geopolymer powder can be used in the load-bearing elements of structures that need to remain at the level of use immediately under the effect of dynamic load.

Keywords: Geopolymer powder; Recycle concrete; Metakaolin; Lime

ANALYSIS OF PROBLEMS POSED BY PRESERVICE ELEMENTARY MATHEMATICS TEACHERS FOR THE ADDITION AND SUBTRACTION OF FRACTIONS

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Abstract

In this study, it was aimed to analyze the problems posed by preservice elemantary mathematics teachers candidates for addition and subtraction with fractions. The case study, one of the qualitative research methods, was adopted in the research. Fifty-nine primary school mathematics teacher candidates participated in the research.
The Problem Posing Test (PPT) consisting of ten items for addition and subtraction with fractions was used as a data collection tool in the research. The data were analyzed by using the error types in the studies of (Işık & Kar, 2014) and (Işık & Kar, 2012). As a result of the analysis, the most common errors are listed as inability to establish a part-whole relationship, assigning a natural number meaning to fraction numbers, not assigning appropriate units to fraction numbers, not assigning meaning to whole parts of integer fractions, and expressing fraction numbers over different wholes.
As a result of the research, it was determined that the deficiencies at the conceptual level regarding the concept of fraction and the difficulties experienced in the verbal language dimension were at the center of the error types detected.

Keywords: problem posing, fractions, addition of fractions, subtraction of fractions

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INTEGRAL REPRESENTATIONS OF k-SRIVASTAVA HYPERGEOMETRIC FUNCTIONS

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Abstract

In this study, we introduce k-Srivastava hypergeometric functions by using Pochhammer k-symbol. We also present some integral representations for these functions.

Keywords: Srivastava hypergeometric functions; Pochhammer k-symbol; Integral representations.

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RECURSION FORMULAS OF k-SRIVASTAVA HYPERGEOMETRIC FUNCTIONS

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Abstract

In this study, various recursion formulas are obtained for k-Srivastava hypergeometric functions defined by k-Pochhammer symbol.

Keywords: Srivastava hypergeometric functions; Pochhammer k-symbol; Recursion formulas.

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COMPUTATION OF H_∞-NORM OF A TRANSFER MATRIX VIA BISECTION ALGORİTHM

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Abstract

In this paper, we compute H_∞-norm of a transfer matrix, via Bisection Algorithm. The algorithm is given and applied some problems. The problems are choosen from diverse areas of control theory such as aircraft models and decentralized interconnected systems,

Keywords: H-infinity control; Bisection method; Hankel singular values, Hamiltonian.

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SEGMENTATION OF ELECTRICITY SUBSCRIBERS BASED ON THE CONSUMPTION PATTERNS

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Abstract

Electricity is a strategic and expensive resource that must be carefully managed. Discovering and accurately modeling the temporal consumption patterns of the subscribers is crucial for offering a reliable energy supply. In addition, energy consumption models are also useful for determining anomalies in the consumption trends and forecasting high-load risks on power distribution nodes.

Feasible modeling of consumption data should be both efficient and accurate. This paper presents a method to cluster customers with similar consumption patterns to increase the overall model accuracy while keeping the number of generated models low. Hourly energy consumption data is collected from real commercial electricity subscribers by using automated meter reading systems. These time-series data are clustered by using the K-means algorithm.

The clustering algorithm is tested on a dataset that contains a 104-day record of hourly energy consumption of 376 commercial subscribers in Turkey. The experimental results are given for two different normalization schemes of daily and weekly usage. The optimal number of clusters for both experiments is determined as 6 by using the elbow heuristic. The inertia metric is calculated as 365.9 for weekly normalized and as 340.2 for the daily normalized data.

Keywords: Customer Segmentation; Electricity Consumption; Clustering; Time-series.

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Dstabil: A Matlab Package for Stability Analysis and Analytical/Numerical Solution of Linear Delay Differential Equation Systems

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Abstract

In this study we consider a linear system of delay differential equations and develop an application called "Dstabil" to carry out stability analysis of equilibrium points of the following system.

$$X' = AX(t-D) + BX, t > 0$$
$$X(t) = \phi(t), t \in [-D, 0]$$

A is a square matrix with dimension $n \times n$ ($n = 1,2,3$), D is a diagonal delay matrix of the same size. Dstabil also has components to determine analytical solution interactively using method of steps and method of characteristics.

Keywords: Delay differential equations; stability of equilibrium solutions.

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Renewable energy in smart grid: Photovoltaic Power Monitoring System based on Machine Learning using an Open-Source IoT Platform

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Abstract

This paper proposes a PV monitoring system based on the internet of things, it is the best solution to monitoring our system. in this system, we have utilized the Raspberry Pi card as a server communicates with a NodeMcu (ESP32) as a client using the MQTT and HTTP protocols respectively. Our solution is composed of two steps, the first step is consisting of power measurement. A voltage constant and current was measured by the ACS712 sensor, we measured the power and energy of the solar panels every 5 min. a DHT sensor has utilized to measure the temperature of solar panels. these measures will be shown on the Node-red platform and stored as a database in the SQLite programming language, SQLite is introduced to reduce the database complexity. Raspberry pi card recorded this database in real-time using WiFi or cable ethernet, we can make with this database accurate projections about the efficiency of solar panels and command our system. However, in the second step, we based on this database, we involve the command in our system by the best method(algorithm) of prediction for our case. the power delivered by solar panels was predicted with the use of machine learning (a model decision tree), which enabled us to generate the forecasts. In practice, we use an electronic card that can support this type of machine learning algorithm, for this, we used the raspberry pi card. Node-red is the most suitable interface to apply this algorithm also it allows us to monitor all measured by the dashboard in real-time with a laptop (WiFi) and with a smartphone (4G).as the result of this work, we have made a smart system based on machine learning that allows to integrates PV into the smart grid. this approach allows us to manage our system in a more efficient, automated, and intelligent manner.

Keywords: Power Monitoring; photovoltaic (PV); smart grid; Internet of Things (IoT); WIFI; NodeMcu; Raspberry pi; Node-RED; SQLite; Machine Learning.

Overview of Some Interval Valued Sequence Spaces

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Abstract

In this paper, Interval sequence spaces, which are a different example of quasilinear space, will be introduced and information will be given about the algebraic and topological structure of one of these spaces.

Keywords: Interval valued sequences; Quasilinear space; Haussdorff metric .

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BLOW UP OF SOLUTIONS FOR THE WAVE EQUATION VARIABLE COEFFICIENTS

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Abstract

In this presentation, we obtain the wave equation with variable coefficients. Under suitable conditions on variable coefficients, we prove the blow up of solutions.

Keywords: Blow up; Wave equation; Variable coefficients.

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ADJOINT CURVES FROM THE MODIFIED FRAME OF INVOLUTE CURVE

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Abstract

In this study, firstly, a modified frame was created from the involute curve of a curve. The adjoint curve of the involute curve was obtained by using the modified frame. Finally, the connections of the obtained adjoint curves with the main curve were calculated.

Keywords: involüt curve, adjoint curve, motifiyle frame

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Several Properties of Compact operators on some generalized Fibonacci difference sequence spaces

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Abstract

In this work, we are going to characterize the matrix classes $\left(l_1, l_p(\hat{F}_r^s)\right)$ $(1 \le p < \infty)$, in which $l_p\left(\hat{F}_r^s\right)$ is some Fibonacci difference sequence spaces for $r, s \in IR$. We also obtain estimates for the norns of bounded linear operators L_A defined by these matrix trasformations and calculate conditions to derive the corresponding subclasses of compact matrix operators by using the Hausdorff measure of noncompactness.

Keywords: Sequence spaces, Fibonacci numbers, compact operators, Hausdorff measure of noncompactness.

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Operators on Some Vector-Valued Orlicz Difference Sequence Spaces

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In this work, we are going to give some sequences of operators which have the same function with a basis for some vector-valued Orlicz difference sequence spaces. At the same time, we characterize the space $B(h_M(\Delta X), Y)$ of continuous operators from $h_M(\Delta X)$ is the space of all Δx – valued sequences $x=(x_k)$ such that

$$\sum_{k=1}^{\infty} M\left(\frac{\|\Delta x_k\|}{\rho}\right) < \infty \text{ for all } \rho > 0.$$

Exactly, we derive that each $T \in B(h_M(\Delta X), Y)$ is equivalent, under certain conditions, to arbitrary sequence $A=(A_k)_{k=1}^{\infty}$ of operators $A_k \in B(\Delta X, Y)$.

Keywords: Operator spaces, Orlich difference sequence spaces, representations of functionals.

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Some results on convergence of soft sequences in soft topological spaces

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Abstract

The notion of soft set was given first by Molodtsov in 1999 [1]. Soft set theory, which brought a new approach to the solution of uncertainties, was later studied in many areas of mathematics from different aspects. Shabir and Naz gave notion of soft topological space in 2011 [2]. In 2013, Das and Samanta obtained some results by describing the convergence of sequences in soft metric spaces [3].

In this study, we obtain some characterizations about the convergence of sequences in soft topological spaces.

Keywords: Soft set, soft point, soft topological space, soft sequence,

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THE CHARACTERIZATIONS OF EQUIDISTANT RULED SURFACES GENERATED BY BINORMAL VECTORS

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Abstract

In the paper, for given two differentiable curves, the characteristics of equidistant ruled surfaces along the striction curves of binormal ruled surfaces are examined. In addition, if the ruled surface is closed, then the pitch, the angle of the pitch, and the drall of these are calculated. An example is provided at the end by providing the corresponding asymptotic plane equations to indicate that the distances between the proper points on these planes are always constant.

Keywords: Ruled surfaces; Equidistant ruled surfaces; Integral invariants.

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The Sine-Gordon Expansion Method and the Modified Expansion Function Method for New Hyperbolic Wave Solutions of Wu-Zhang System Models

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Abstract

In this paper, we investigate some solitary wave solutions of the Wu-Zhang system by using the sine-Gordon expansion method and the modified expansion function method. We successfully obtain some new hyperbolic wave solutions of this model. After then, two and three dimensional graphs of the obtained soliton solutions of the models are drawn by choosing the appropriate parameters. All the calculations in this study are done with Wolfram Mathematica software.

Keywords: The Sine-Gordon expansion method, The modified expansion function method, Wu-Zhang system

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A WOUND/SLOUGH MODEL ACCOUNTING FOR CELLULAR DIFFUSION AND DEBRIDEMENT

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Abstract

In this study, we consider the nondimensionalized wound/slough interaction model [1] and develop it to have impulsive effects which can be stated as

$$U_t = \Delta U + N_1(U,V), \boldsymbol{x} \in [0,1]^n, t > 0$$
$$V_t = D\Delta V + N_2(U,V) + I_i\big(\mathrm{V}(t_i,\boldsymbol{x})\big), i = 0,1,2, \ldots$$

where Δ is the usual Laplace operator for $n = 1,2,3$; D is a nondimensional parameter accounting for cellular diffusion; N_1 and N_2 are the reaction terms; U, V are the cellular density of wound and slough respectively.

The impulsive effects are used to simulate medical treatment technique known as debridement [2] which is implemented at $t = t_1, t_2, \ldots$ to speed up the healing process, the $I_i(.)$'s are control functions to be determined to achieve optimal healing.

Keywords: Wound healing; Impulsive differential equations; Debridement.

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A STUDY ON THE STATUS OF RESEARCH ON SCİENCE TEACHERS' OPİNİONS ON STEM PRACTİCES

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Abstract

21st century (century) skills in education are related to many fields, and these connections enable us to use different disciplines together. The areas that provide these connections in science are mathematics, engineering, and technology. Another goal of 21st-century skills in education is to raise scientifically literate individuals, and these individuals use science, mathematics, engineering, and technology (STEM) skills together. Various studies are carried out to provide individuals with these skills through training programs. In this context, teachers and students are supported with different educational training.

In the literature, it is seen that reports on STEM applications are mostly related to students. On the contrary, studies about the opinion of the teachers are limited. So that the new studies about STEM can be planned, it is essential to make a situation analysis first. The studies examining the opinion of science teachers about STEM practices in graduate studies were compiled, and suggestions were presented. The study method was carried out with document analysis, a qualitative data collection method. The date range, approach, aim, and results of the studies on science teachers' opinions about STEM applications were analyzed. The journal articles and master thesis, which are reached from the national academic database (ULAKBIM) and Higher Education Institution National Thesis Centre (YÖK), were selected for analysis between 2016 and 2022. The scope of the research was limited by the "the science course" keyword. Seventeen reports were obtained within the range of the study. Six master's theses and eleven journal articles were examined in the research. Topics are presented by relating self-efficacy and different variables. The most common problems in the studies have been determined that teachers have a shortage of materials in STEM education and teachers have difficulties integrating knowledge from different disciplines with science education. Following these, science teachers' perception of themselves as inadequate in STEM, crowded classrooms, and problems in evaluating students in STEM applications are other main problems.

According to science teachers, to eliminate these problems in STEM practices, STEM applications should be integrated into the science teaching undergraduate program with compulsory courses. And also, the content of in-service, both online and face-to-face training given to teachers, should be expanded with activities and assessment, and evaluation stages should be added to this training. It is recommended that non-thesis master's programs be opened in universities.

Keywords: STEM; STEM education; FeTeMM education; Content analysis; science course.

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Sustainable Fisheries with Optimal Control Theory

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Abstract

Fish populations are an important part of marine ecosystems, and any violation in the harvesting of fish populations is directly affecting marine ecosystems and their resilience. Since fish populations are a vital source of food for the human population worldwide, their harvesting strategies are very important for both sustainable fisheries and resilient ecosystems. There have been three common sustainable harvest techniques: seasonal fisheries, no-take marine reserves (marine protected areas), and ecosystem-based fishery management. Having these three most known techniques in mind for sustainable fisheries, in this study, I will discuss a more complete and general technique for sustainable fisheries. This technique consists of the implementation of optimal control theory together with food chain models governed by differential equations or partial differential equations. This technique not only offers optimal harvesting strategies but also offers the most profitable harvesting strategies for fish stocks and helps to investigate the effect of fisheries on their corresponding ecosystems. In many cases, no-take marine reserve areas and seasonal fisheries are natural results of the optimal control application in fishery management. Besides these, this technique provides more accurate and realistic harvesting strategies as compared to traditional harvesting strategies.

Keywords: Sustainable fishery, optimal control, harvesting, harvesting strategies, food chain modeling.

THE ELECTRONIC AND OPTICAL PROPERTIES OF GRAPHENE QUANTUM DOTS PYRENE FAMILY

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Abstract

This work is devoted to the study of the electronic and optical properties of graphene-based quantum dots investigated using perturbation theorie GGA of the Perdew-Burke-Ernzerhof (PBE). The ground proprties is calculated using materials studio. Formation energy, hardness, and electrophilicity show that all structures, from pyrene to silicene QD passing through 15 CSi QD configurations, are energetically and chemically stable. It is also found that they are reactive which implies their favorite character for the possible electronic transport and conductivity. The electronic and optical properties such as absorption, Refractive index, reflectivity, and conductivity all these propreties are very sensitive to the number and position of the substituted silicon-atoms as well as the directions of the light polarization. Moreover, quantum confinement effects make the exciton binding energy of CSi quantum dots larger than their higher dimensional allotropes such as silicene, graphene, SiC sheet, and nanotube. It is also higher compared to other shapes of quantum dots like hexagonal graphene QDs and can be tailored from the ultraviolet region to the visible one. The values of the singlet-triplet splitting determined for the X- and Y-light polarized indicate that all configurations have a high fluorescence quantum yield compared to typical semiconductors, which makes them very promising for various applications such as the light-emitting diode material photovoltaic and nanomedicine.

Keywords: Graphene ; Quantum dots; GGA; PBE.

WEB 3.0 (SEMANTICS) APPLICATIONS IN EDUCATION

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Abstrat

The number of web pages, which was 110 thousand in 1994, reached 63 billion in a short period of fifteen years. Today, this number is many times higher. The use of technology in educationalenvironments continues to increase day by day. As stated by many academics and researchers, the use of technology in educational areas has proven to be a mandatory requirement with the recent Covid-19 pandemic. Thanks to the new technologies, access to information, communication, and high-level calculations have become more accessible. The development ofinternet technology is the main reason for these conveniences. Thanks to the developed infrastructures and lightning-fast internet access, the creation of collaborative learning platforms in educational environments are increasing rapidly. The development of the Internet brings the web to us in different versions. Web 2.0 in the social web category came to the fore in 2004. Although artificial intelligence-based web 3.0, which is called semantic web, has not completed its development yet, it excites people in terms of the future of the web. The rapid increase of data on the Internet and the need to make it meaningful is one of the reasons for theformation of the semantic web.

Web 3.0 (Semantic Web) technology has emerged with the idea of making sense of countless data entered in the internet environment in machine language and accumulating this data on a platform. The data made sense by Web 3.0 technology makes it easier to use the internet environment and access information by returning results according to the history, usage habits,and search filters of the users. There are already technologies in metadata to use Semantic Web technology, which is encoded. Web 3.0 is the next generation of internet technology based on machine learning, artificial intelligence (AI), and blockchain technology. This concept was created by Gavin Wood, founder of Polkadot and co-founder of Ethereum. While Web 2.0 will focus on user-created content located on central websites, Web 3.0 will give users more control over their online data. Web 3.0 aims to provide personalized and relevant information more quickly using artificial intelligence and advanced machine learning techniques. Developing more intelligent algorithms and Big Data analytics means machines can intuitively understandand suggest content. This study aimed to review the studies related to the use of Web 3.0 technologies in education in a systematic way.

Keywords: Semantic Web, literature review, distance education, future education

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Some New Sequence Spaces of Generalized Fractional Order

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Abstract

In this study, by using the generalized difference operator, we introduce the new fractional difference sequence spaces $c(B^{\tilde{\alpha}})$ and $c_0(B^{\tilde{\alpha}})$. We also investigate their topological properties and compute α−, β− , γ− duals and matrix transform.

Keywords: Difference Operator, Dual Space, Matrix Transform.

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MARSHALL OLKİN GARİMA DISTRUBUTİON AND STATİSTİCAL PROPERTIES

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Abstract

A two-parameter Marshall-Olkin-Garima distribution is introduced and its structural, statistical properties are investigated. These include the compounding representation of the distribution, the shapes of the density and hazard rate functions, the moments and quantiles as well as the limiting distributions of extreme order statistics. Afterwards, the superiority of Marshall Olkin Garima distribution over the other known distributions on the real data set was shown.

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Keywords:. Marshall-Olkin Distrubution, Garima distribution.

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A NUMERICAL APPROACH FOR SAWADA-KOTERA EQUATION WITH TRIGONOMETRIC QUINTIC B-SPLINE COLLOCATION METHOD

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Abstract

In this paper, we deal with the numerical solution of Sawada-Kotera (SK) equation classified as the type of fifth order Korteweg-de Veries (gfKdV) equations. In the first step of our work consisting of several steps, nonlinear model problem is degraded by using $w_{xxx} = v$ and obtained the system with the coupled new equations. In the second step, Rubin-Graves type linearization are used to get rid of nonlinearity problem. After these applications, approximate solutions are obtained by using the trigonometric quintic B-Spline collocation method. The effiency and accuracy of the present method is demostrated with the tables and graphs. As seen as the tables given with L_2 and L_∞ error norms for different time and space steps, the present method is more accurate for the larger element numbers and smaller time steps.

Keywords: Sawada-Kotera Equation, Collocation Finite Element Method, Trigonometric Quintic B-Spline Basis, Rubin-Graves Type Linearization.

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A COLLOCATION FINITE ELEMENT SOLUTION FOR THE FRACTIONAL FOKKER-PLANCK PROBLEM

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Abstract

In this study, the numerical solutions of the fractional Fokker-Planck equations have been investigated. Firstly, the general finite element schemes have been obtained by using collocation finite element method suited with the trigonometric quintic B-spline basis functions. Then, the present method has been tested on two fundamental problems having different boundary conditions. The newly numerical results contained error norms L_2 and L_∞ are compared with the exact ones and other solutions for the different time steps and space steps. It is seen that from the tables and graphics, the numerical solutions are compatible with the exact solutions. Also, it can be said that more accurate solutions are avaliable for the larger element numbers and smaller time steps.

Keywords: Fokker-Planck Equation, Collocation Finite Element Method, Trigonometric Quintic B-Spline Basis Functions.

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THE RELATIONSHIP OF BILINGUALITY OF STUDENTS WITH THE ACHIEVEMENT OF SCIENCE COURSE

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Abstract

In this study, 67 middle school 5th grade students whose mother tongue is different from the language they are taught in Çermik district of Diyarbakır in the 2019-2020 academic year and are educated with their mother tongue in the town of Camas, Ordu. In the study, the success of the Science course and reading comprehension of the students studying in their mother tongue and those studying in a language other than their mother tongue were examined in the study. It was revealed that gender does not have an effect on the reading comprehension and science achievement of monolingual and bilingual students. It was concluded that there is a positive and hing level relationship between the success of the science courses of students with different native languages and their reading comprehension.

Keywords: Mother Tongue, Monolingualism, Bilingualism, Science Education

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ON THE MODIFIED ORTHOGONAL FRAMES OF THE NON-UNIT SPEED CURVES IN EUCLIDEAN SPACE E^3

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Abstract

In this study, the modified frames with both the non-zero curvature and the torsion of the non-unit speed curves in Euclidean space E^3 are examined. The relationships between the derivative vectors of the modified frame and the Frenet vectors or the vectors of the modified frame of the curve are given. Besides, the Darboux vectors obtained from the modified orthogonal frames with both the curvature and torsion of the curve and the unit vectors in the direction of these Darboux vectors are investigated. Finally, all these results are shown on the sample curves.

Keywords: Modified orthogonal frame, Frenet frame, Darboux vector

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SOFT TOPOLOGICAL HYPERVECTOR SPACES

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Abstract

The aim of this paper is to introduce soft topological hypervector spaces, a new soft topological structure, by presenting a topological approach to the theory of hyperstructures, which is a generalization of classical theory, and soft set theory, which is one of the powerful mathematical theories that models uncertainty. In this perspective, some important results are obtained by studying its different properties. In addition, the relationships between hypervector spaces, soft hypervector spaces, topological hypervector spaces and soft topological hypervector spaces are examined in detail.

Keywords: Soft set; hypervector space; topological vector space; topological hypervector space; soft topological hypervector space.

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NEW NUMERICAL SCHEME FOR SOLVING OF SINGULARLY PERTURBED PROBLEM WITH NONLOCAL BOUNDARY CONDITIONS

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Abstract

We consider the singular perturbed problem with nonlocal boundary value on Bakhvalov type mesh. We show that the scheme converges in the first order at the discrete maximum norm independent of the perturbation parameter. The effectiveness of the proposed method is supported by the results of applying the method to a singularly perturbed problem. As a result, it is seen that the numerical operation supports the theoretical results.

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CONTENT ANALYSIS OF THE THESES ABOUT MATHEMATICAL PATTERN IN TURKISH CONTEXT

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Abstract

It is a fact that mathematical knowledge is based on patterns and structures (Mulligan and Mitchelmore, 2009). In this study, it was aimed to make an examination from a thematic aspect on the theses which were prepared on mathematical pattren in Turkey. For this purpose, 24 postgraduate theses about mathematical pattern in mathematics education were examined. Theses were examined through document analysis in terms of variables such as type, year, sample type, sample size, method, data collection tools, research topic. In the study, the data were analyzed by content analysis method. Descriptive statistics such as frequency and percentage were used. As a result of the research, it was found out that the number of master's theses was more. It was seen that 2017 was the year when the highest number of thesis were prepared. Qualitative methods were predominantly used in the theses studied. It was determined that a lot of studies were carried out with middle school students. Students' ability to generalize patterns and the effect of different learning methods on students' pattern success are among the most frequently researched topics. In line with the results of the research, some suggestions were made to the researchers considering to work in this field.

Keywords: Mathematical pattern, Postgraduate theses, Mathematics education

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A NEW TASK FOR MATHEMATICALLY GIFTED STUDENTS: CONSECUTIVE NUMBERS TRIANGLE

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Abstract

One of the characteristic features of mathematically gifted students is their mental effort on mathematical and complex tasks (Leikin, Leikin, Paz-Baruch, Waisman, and Lev, 2017). In addition, gifted students prefer challenging tasks in learning environments (Wu, Jen, and Gentry, 2018). In this context, in this study, it is aimed to design a new number model consisting of counting numbers based on Pascal's Triangle, on which mathematical gifted students can work, and to examine the mathematical structure of this model. In the study, counting numbers were arranged sequentially in a triangular structure in the Excel Program. Later, the special triangular structure was called the "Consecutive Numbers Triangle". When the number groups were examined in the resulting model, it was discovered that each of the numbers was formed according to a rule. In addition, some special numbers (multiples of 2, 3, 4, 5, 10, square and prime numbers) were determined and the patterns formed by coloring only these numbers in the model were determined. In order to determine the patterns exactly, the numbers were written up to 1087 in the model. It was seen that a magnificent pattern was formed for each special issue. Since groups of numbers other than prime numbers are formed with a certain rule, the images of these numbers are formed with a regularity.

Keywords: Pascal's Triangle, Consecutive numbers, Mathematical giftedness, Mathematics education

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Analysis of The Peer Bullying in Schools Considering by Fractional Order Metapopulation Modelling

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Abstract

Peer bullying, which has been up-to-date from past to present and continues to spread rapidly in schools, is a worrying problem on students' well-being and functionality. This problem in social sciences has been addressed in this study with the mathematical model considered by the metapopulation model. Mathematical models can be helpful in explaining a system, examining the effects of different components, and predicting behavior. Through the mathematical model considered in this context, it is aimed to determine the effects of the actors playing a role in peer bullying in schools and their relationship with each other, to determine the level of peer bullying and to obtain important findings about how to prevent bullying. While doing literature reviewing we realized that a comprehensive mathematical model regarding peer bullying, which is an extremely important concept for social sciences and students, has not been considered yet. Based on this deficiency in the literature, a realistic mathematical model of peer bullying in schools has been considered in our study. This mathematical model is handled with the help of the fractional operator, and first the local and global stability analysis of the equilibrium points of the model, then the positivity, existence and uniqueness of the solutions will be shown. According to us, this study is very important in terms of its original and multidisciplinary approach to a subject in the field of social sciences.

Keywords: Peer bullying; Fractional operator; Local stability; Global stability; Existence and uniqueness; Lyapunov function.

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Mathematical Modelling and Speed Control Optimization of PMSM Machine for Electric Vehicle Application

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Abstract

Electric vehicles are not something new in this world, however the manufacturers are trying to develop their properties. Since the battery and the electric motors are the essential parts of it, this paper is going to deal with the mathematical modelling and the control of electric motors, especially the permanent magnet synchronous machine (PMSM). The work has begun by using a mathematical model with this machine and analysing it. The first finding revealed that the most fundamental parameters of PMSM, torque and flux, are coupled with each other. Furthermore, we made use of a widely used control, which is FOC, in order to decouple the torque and the flux. We decoupled them by controlling the current as well, since the equation of all the elements is proportional. In the second result, we found an equation that combines speed and torque, in which the speed can also be controlled by the current or the inverse. The results of the two tests using this mathematical model and field oriented control algorithm (FOC) to control the speed of PMSM reveal that the second one is more optimised than the first. Differently, in the first one, we use three PID regulator, but we use only one in the second. These systems are simulated in MATLAB/SIMULINK environment. To conclude, the two tests rendered the same results: fast response and good reference speed tracking, unless the second is the most optimised and appropriate.

Keywords – Mathematical Modeling, PMSM, FOC, Speed control, PID regulator

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Analysis of The Vectored Plant Disease Model Considering by Fractional Operator

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Abstract

Mathematical models are used in social sciences (economics, psychology, sociology, political science, etc.) as well as in natural sciences (physics, biology, earth science, meteorology, etc.) and engineering disciplines (computer science, artificial intelligence, etc.). Plant models of plant-virus and plant-vector-models are very useful for general idea of disease incidence class and general plant virus. This product is similar to a crop from field-harvested cuttings, the second plant-v-vector pattern elevators. This mathematical model is handled with the help of the fractional operator, and first the local and global stability analysis of the equilibrium points of the model, then the positivity, existence and uniqueness of the solutions will be shown.

Keywords: Vectored plant disease; Fractional operator; Local stability; Global stability; Existence and uniqueness; Lyapunov function.

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On the Topologies in Dual Space and the Analyticity of Dual Functions

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Abstract

In this paper, the properties of the order relation on dual numbers are examined in detail. Using the order relation $<_{\mathrm{D}}$, we obtain the topologies on D^n denoted by $\bar{\tau}_{\bar{d}}$ and $\bar{\tau}$ such that the spaces $(\mathrm{D}^n, \bar{\tau}_{\bar{d}})$ and $(\mathrm{D}^n, \bar{\tau})$ are Hausdorff spaces. After then, how the analyticity conditions of a dual function which is often expressed in other studies are obtained is given clearly. Making use of the topology $\bar{\tau}_{\bar{d}}$, the dual analytic areas of dual analytic functions are determined.

Keywords: Dual numbers; Dual Inequalities; Topology; Dual Analytic Functions.

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EXAMINING SECONDARY MATHEMATICS TEACHERS' OPINIONS ABOUT THE EMERGED PROBLEMS DURING THE TEACHING OF MATHEMATICS

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Abstract

The aim of this study is to examine secondary mathematics teachers' thinking about the problems that arise in the process of teaching mathematics. It is important that the in-service mathematics teachers need to maintain their professional development to keep up with the new era from several perspectives [1]. In this respect, the Ministry of National Education carries out several professional development programs to support teachers' professional development. However, teachers may still experience some troubles in the in-class teaching process stemming from students or themselves. This study, it is aimed to identify the problems experienced by secondary mathematics teachers in the in-class mathematics teaching process and to provide recommendations to cope with them. The current study is a case study that is one of the qualitative research methods. The participants consisted of 12 secondary mathematics teachers working in high schools in a province in the Southeastern Anatolia Region of Turkey who are selected by the purposeful sampling method. The questionnaire created by the researchers was applied to the teachers separately by semi-structured interview technique. The descriptive analysis method was used in the analysis of the obtained raw data. When analyzing the data, codes obtained from the literature and the findings of the research formed themes. The findings showed that teachers expressed frequently the problems such as a low readiness level of students, lack of knowledge in course sources, frequent use of traditional teaching methods rather than new approaches, and typically use of traditional questions during the in-class teaching. Moreover, teachers made suggestions to overcome these troubles.

Keywords: Secondary mathematics teachers; Problems; Mathematics teaching.

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FRACTIONAL OPTIMAL CONTROL OF AN EPIDEMIC MODELED WITH TWO TYPES OF NONLINEAR INCIDENCE RATES

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Abstract

This study aims to propose the optimal treatment method for an epidemic under the effect of different nonlinear incidence rates [1]. This rate represents the relationship between infected and susceptible individuals, and also makes it possible to predict the progression of disease starting to spread in a population. Depending on the nature of the disease, it can be described by various functional relations. The model under discussion is in terms of the Caputo fractional derivative [2]. The main purpose is to compare the effects of two nonlinear incidence rates on the controlled system. Numerical solutions are simulated with MATLAB software. Comparisons of optimal solutions according to the problem parameters are given in the graphics.

Keywords: Epidemic model; Fractional optimal control; Caputo fractional derivative; Incidence rate

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FURTHER ON k-FRACTIONAL OPERATORS INVOLVING MITTAG-LEFFLER FUNCTIONS FOR STRONGLY $(\alpha, h-m)$-CONVEX FUNCTIONS

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Abstract

Integral operators, which form a significant part of fractional calculus, are resources in numerous areas like theory of inequality, statistics, mathematical biology, modelling and engineering which take profit from the fractional analysis. Many inequalities have led to the creation of generalized and new approaches through fractional integral operators.

The purpose of this article is to improve the bounds of the k-fractional integral operators defined for strongly $(\alpha, h-m)$-convexity. To obtain the required results, extended generalized Mittag-Leffler functions are used. The results introduced in this article can be considered an important advancement of previously published conclusions.

Keywords: Mittag-Leffler function; Strongly $(\alpha, h-m)$-convex function; k-fractional integrals.

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EXAMINATION OF 8TH GRADE STUDENTS' OPINIONS ON NEW GENERATION QUESTIONS

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Abstract

The aim of this study is to examine the opinions of 8th grade students about new generation questions. In the study, the phenomenology method, which examines the subjective experiences of people with the event or situation they live, was used. The sample of the study consist of 8th grade students in Ordu province. The convenient sampling technique (Yıldırım & Şimşek, 2018) which not only adds speed and practicality to the research, but also allows the researcher to choose a situation that is close and easily accessible was used in the study, since the students in the study group consist of the students of the teacher conducting the research. In the study, the Interview Form developed by the researchers was used as data collection tool. In this form, there are open-ended questions to reveal students' views on new generation questions. As a result of the study, it was seen that the students defined the new generation questions as long, challenging, intertwined problems, and boredom. In addition, most of the students stated that they did not encounter these question types until they passed the 8th grade, and many students stated that they had difficulty in solving these question types. Most of the students stated that such questions are unnecessary and that instead of these questions, questions about acquisitions in the curriculum should be asked in the exams. Students think that new generation questions should be simplified. According to the results obtained from the study, it was seen that most of the students did not know why such questions were included in the curriculum. Besides, they said that they were alienated from the mathematics because of these questions, they gave up studying mathematics and they did not want to choose a profession related to mathematics in the future. In the light of the results obtained from the study, suggestions were made for different studies and learning environments that can be done on the subject.

Keywords: New generation questions; 8th grade students, Phenomenology study

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An optimal control strategy for an H1N1 model

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Abstract

In this work, control strategies to avoid the spread of the H1N1 virus with the three-compartment SIR model are discussed. For this, two control terms, meaning precaution (mask, social distance, hygiene, etc.) and vaccination, were adapted to a without control model [1]. The purpose of these controls is to decline the number of susceptible and infected individuals. First, necessary optimality conditions are obtained for optimal control of disease spreading [2]. Then, numerical solutions of the optimal system are found by applying the forward-backward fourth-order Runge-Kutta method. The dynamics of the controlled and uncontrolled models are simulated using the MATLAB program and the controls decreased the number of susceptible and infected individuals with the desired target.

Keywords: Optimal control, H1N1, SIR epidemiological model, Fourth-order Runge-Kutta Method.

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STOCHASTIC DIFFERENTIAL EQUATION MODELING FOR GOLD DATA WITH YUIMAGUI

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Abstract

In this study, GOLD data versus USD is investigated by Stochastic Differential Equation Modeling (SDEM). First of all, Square Root Process, Geometric Brownian Motion (GBM), Vasicek Model (VAS), and Cox-Ingersoll-Ross (CIR) models have selected from the most preferred models in finance. Then, the parameters of the mentioned SDE models have estimated using the quasi maximum likelihood method. Secondly, It has been given the p-value for the Kolmogorov-Smirnov test that checks if the empirical and theoretical distribution are the same to see the goodness of fit of the model. Accordingly, all selected models fit well with the given data. After that, model selection has been made among these 4 compatible models according to AIC and BIC criteria. Therefore, for the given data, the VAS model is the most appropriate model according to both criteria. Finally, by using the VAS model, which has been chosen as the most appropriate model, and applying Euler-Maruyama Approximation Method future simulation trajectories of 100 steps between 25.04.2022 and 25.04.2023 have been obtained. Gold opening data with the symbol GC=F between 02.01.2020 and 25.04.2022 have obtained with the help of https://finance.yahoo.com/ link, with the YUIMAGUI interface of the RSTUDIO program and all results have also made by using YUIMAGUI. These results are also corroborated by graphical representation.

Keywords: stochastic differential equation , quasi maximum likelihood, Euler-Maruyama aroximation method,square root process, CIR, GBM, VAS, YUIMAGUI.

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P-SASAKIAN MANIFOLDS AND THEIR CURVATURE CLASSIFICATION

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ABSTRACT. The object of this paper is to study the curvature tensors of P-Sasakian manifold satisfying the conditions $W_1^* \cdot S = 0$, $W_1^* \cdot P = 0$, $W_1^* \cdot W_9 = 0$ and $W_1^* \cdot W_1^* = 0$. According these cases, P-Sasakian manifolds have been characterized such as η-Einstein and Einstein. In addition, we research W_1^*-flat and W_9-flat a P-Sasakian manifold. The results obtained are interesting and give an idea about the geometry of P-Sasakian manifold.

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Key words and phrases. P-Sasakian Manifold, η-Einstein manifold, W_1^* curvature tensor.

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ON P-SASAKIAN MANIFOLDS SATISFYING CERTAIN CURVATURE CONDITIONS

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Abstract. The aim of this paper is to study the curvature tensors of P-Sasakian manifold satisfying the conditions $W_1 \cdot W_5 = 0$, $W_1 \cdot W_6 = 0$, $W_1 \cdot W_7 = 0$ and $W_1 \cdot W_8 = 0$. Also, we study W_1-pseudo symmetry for a P-Sasakian manifold. We think that some interesting results on a P-Sasakian manifold are obtained.

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Key words and phrases. P-Sasakian Manifold, η-Einstein manifold, W_1-curvature tensor.

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OMAR KHAYYAM'S PLACE AND IMPORTANCE IN THE HISTORY OF MATHEMATICS

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Abstract

The aim of this study is to introduce Omar Khayyam and his works in terms of history of mathematics and mathematics education. Omar Khayyam is an Iranian Muslim scholar and is one of the most important mathematicians who contributed to this field by playing a major role in the advancement of mathematics in his time. Khayyam was interested in algebra, geometry, astronomy, physics and medicine, was engaged in music, and also wrote his rubais, poems that immortalized his name. Khayyam had a great influence on the development of mathematics in general and analytical geometry in particular. He showed that a cubic equation can have more than one solution, and how intersections of conic sections, such as parabolas and circles, can be used to obtain geometric solutions of cubic equations. He also proved for the first time that irrational numbers can be used like rational numbers in mathematical operations. In addition to these, Khayyam argued that algebraic facts emerged as geometric facts. Thus, he took an important step towards closing the gap between numerical and geometric algebra long before Descartes. With all these works, he contributed to the science of mathematics and guided the studies in the field of mathematics today.

Keywords: Omar Khayyam; Mathematics education.

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A DOCUMENT ANALYSIS ON THE EFFECT OF FINLAND AND TURKISH EDUCATION SYSTEMS ON PISA SUCCESS

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The aim of the study examines the differences between the Finnish and Turkish education models and their impact on PISA success. By considering the factors behind the success in PISA exams, the similarities and differences between the two education models were determined with the document review method. It was aimed to make suggestions for increasing the success of PISA. A holistic approach is aimed at the Finnish curriculum, while a constructivist approach is aimed at the Turkish education model. Since 2018, it has been supported by the spiral approach in the Turkish curriculum. With the spiral approach, repetitive acquisitions and explanations at the different subject and grade levels are included, and learning outcomes that are holistic aim to be gained at once. It is planned to evaluate the effect of the Turkish education model, the constructivist approach model, and the Finnish education model on the science literacy of the Pisa exams.

Keywords: Finnish education system, Turkish education system, science literacy

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Some Asymptotic Features of Hyper-Airy Equation

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Abstract

Special functions, such as the gamma function, hypergeometric function, and Airy function, play a central role in the advancement of mathematical asymptotics [1,2,3,4] which has been an active research area in recent years. This talk examines the hyper-Airy differential equation [3], which is a fourth-order version of the Airy equation, in some limits. It addresses some of its asymptotic features that are not explicitly visible to classical asymptotic analysis.

Keywords: Asymptotic analysis; Divergent series; Small exponentials.

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Total Dominator Chromatic Number of Lexicographic Product of a Cycle to a Graph

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Abstract

Coloring and domination are well-studied topics in graph theory. Motivated by the relation between coloring and total domination, the notion of total dominator coloring is studied by many authors [1,2,3]. A total dominator coloring of a graph G with no isolated vertex is a proper coloring of G in which each vertex of the graph is adjacent to every vertex of some (other) color class. The total dominator chromatic number of G is the minimum number of color classes in a total dominator coloring of it. This talk is about the total dominator coloring and examines the total dominator chromatic number of lexicographic product of a cycle to a graph.

Keywords: Total domination; Total dominator coloring; Lexicographic product.

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BEZIER CURVES AND PATCHES WITH MODIFIED BERNSTEIN BASIS

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Abstract

In this paper, a new generalization of Bezier curves and surfaces are introduced by means of some modified Bernstein polynomial basis. The continuity conditions for the corresponding piecewise Bezier surfaces are discussed. An example is provided to illustrate the comparisons among the new and the classical Bernstein based Bezier objects.

Keywords: Bezier curves; Bezier Surfaces; G1, C1 continuity, Bernstein polynomials.

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Revisiting Chatterjea Type Nonunique Fixed Point Theorems via Interpolation in QP_b - Space

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Abstract

In the early years of the 20th century, the renowned mathematician Banach [1] commenced the concept of the Banach Contraction Principle. Due to its consequences and feasible implementations, the idea has been enlarged and generalized in various directions [2]-[6]. Recently, Karapinar [7] adopted an interpolative approach to establish fixed point results in the setting of complete metric space. In 2016, Gupta and Gautam [8]-[9] defined a new metric space known as quasi- partial b -metric space and proved fixed point theorems on this space. Inspired by these results, we have redefined the Chatterjea type contraction in the framework of quasi-partial b-metric space and proved the corresponding common fixed point theorem by adopting the notion of interpolation. The results are further validated with the application based on them. The applications of interpolative contraction in sensitivity analysis of experimental signals and synthesis of scientific data where approximation of natural curves and surfaces is needed, are illustrated here. Examples are given which are based on the new approach.

Keywords: Chatterjea type contraction; quasi-partial b-metric space; interpolative contraction; fixed point

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A NOVEL NUMERICAL APPROXIMATION FOR SINGULARLY PERTURBED VOLTERRA INTEGRO-DIFFERENTIAL EQUATION WITH INTEGRAL BOUNDARY CONDITION

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Abstract

In this paper, the initial value problem for the singularly perturbed Volterra integro-differential equation with integral boundary condition was considered. Our purpose is to construct and analyze a numerical approach with uniform convergence according to ε. The numerical solution of the considered problem is discretized on a uniform mesh using implicit difference rules for the differential part and the composite right-side rectangle rule for the integral part. It is shown that the method displays first-order uniform convergence in the perturbation parameter. Also, numerical experiments are studied to show the performance and viability of the proposed approach.

Keywords: Singularly perturbed problem; Numerical solution; Boundary layer; Uniform convergence.

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CONVERGENCE ANALYSIS OF FITTED NUMERICAL METHOD FOR A SINGULARLY PERTURBED NONLINEAR VOLTERRA INTEGRO-DIFFERENTIAL EQUATION WITH INTEGRAL BOUNDARY CONDITION

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Abstract

This work is concerned with a singularly perturbed nonlinear Volterra integro-differential equation with integral boundary condition. Firstly, bounds on the solution and its derivative of the solution of this problem are derived. To solve it numerically, we use a fitted difference scheme on a piecewise mesh (Shishkin type mesh), which is discretized using quadrature rules for the differential part and the composite numerical quadrature rules for both integral part in the equation and integral boundary condition. Then, the stability and convergence analysis of the numerical approach are discussed and analyzed. Furthermore, numerical results supporting the theoretical results are presented.

Keywords: Volterra integro-differential equations; Singularly perturbation; Error estimate; Shishkin mesh.

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EVALUATION OF TEACHER CANDIDATES' BIOTECHNOLOGY KNOWLEDGE LEVELS AND ATTITUDES TOWARDS BIOTECHNOLOGY

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Today, science and technology are developing rapidly, and the importance of science is increasing in almost every part of society. With these technological developments, the relationship between science and society gains importance. Within the general objectives of science education, besides teaching the scientific concepts underlying the developments in science and technology, individuals follow these developments. It is necessary to ensure that they are scientifically literate. When the literature is examined, it is seen that pre-service science teachers and science teachers need more information in areas such as genetic engineering, cloning, and genetically modified organisms.

This study aims to determine the knowledge level of pre-service science teachers about biotechnology and evaluate their attitudes towards biotechnological developments. The study was modeled according to the descriptive survey model. In the research, the biotechnology knowledge scale with 22 questions developed by Yüce in 2011 and the biotechnology attitude scale with 46 questions developed by Yazıcı in 2009 was used to determine the knowledge level of pre-service science teachers on biotechnology subjects. These scales were applied to 60 science teacher candidates studying at a state university in North Anatolia in the 2021-2022 academic year. The knowledge of pre-service science teachers about biotechnology was investigated according to different variables (gender, class of education, whether or not they had taken a Biotechnology course). The obtained data were analyzed using the SPSS 26 package program.

When the research results are evaluated, it is seen that the biotechnology knowledge levels of the science teacher candidates; It has been determined that there is a statistically significant difference according to the level of education and the status of taking the course or not. This statistical difference favored the 2nd year students who took the course. In addition, a significant ($p < 0.05$) difference was found in the biotechnology attitude levels of science teacher candidates according to their gender. This difference was in favor of female teacher candidates. However, no statistically significant difference was found between knowledge levels and gender. A statistically significant difference was not determined according to the biotechnology attitude levels of teacher candidates, their grade level, and whether they took the course or not.

Keywords: quantitative analysis, pre-service science teacher, attitude

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A neutrosophic correlation coefficient and its application in recognition of patterns

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Abstract

In probability and statistical theory, the correlation coefficient indicates the strength of the linear correlation between two random variables. In this study, a new correlation coefficient is defined between neutrosophic sets (NS). This new approach is defined in the range [-1, 1], similar to classical statistics, and it shows the strength of the relationship between the considered NSs. Finally, to show the usefulness of the proposed new measure, a pattern recognition problem is resolved with the help of the defined measure.

Keywords: Neutrosophic set; Correlation coefficient; Decision making; Pattern recognition

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New distance measure for neutrosophic sets and its application in medical diagnosis

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Abstract

As a new extended form of intuitionistic fuzzy sets, neutrosophic sets are powerful tools for describing uncertainty and uncertainty in complex problems. In this study, we describe a new measure of distance for neutrosophic sets based on triangular divergence. Next, we prove that the proposed distance measurement methods meet the axiomatic requirements of the distance function. We also use proposed distance measure method to solve a medical diagnostic problem in the neutrosophic universe.

Keywords: Neutrosophic set; Distance measure; Medical diagnostic, Decision making

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A STUDY ON SOME SEQUENCE SETS BASED ON LUCAS BAND MATRIX AND MODULUS FUNCTIONS

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Abstract

In this paper, we introduce the sequence sets $\ell_p\left(F^k, u, \hat{E}(r,s)\right)$ and $\ell_\infty\left(F^k, u, \hat{E}(r,s)\right)$ which are depended on Lucas band matrix and modulus functions. After that we extend our study and generalize the sequence sets $\ell_p\left(F^k, u, N, \hat{E}(r,s)\right)$ and $\ell_\infty\left(F^k, u, N, \hat{E}(r,s)\right)$ over a normed linear space (S, N). Furthermore, we study on some properties of these sequence sets and obtain some inclusion relations related to them.

Keywords: Lucas numbers, Modulus function, Sequence space, BK-space.

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THE EFFECT OF MIND AND INTELLIGENCE GAMES COURSE ON STUDENTS' MATHEMATICS ACHIEVEMENT: AN EXPERIMENTAL STUDY

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Abstract

In this study, it is aimed to examine the effect of mind and intelligence games on the academic achievement of students in mathematics. Sudoku from reasoning and operation games, reversi, go and mangala games from strategy games were determined. Experimental study method, one of the quantitative research methods, was used in the study. The research was carried out in a public school in Fatsa district of ORDU province in the 2021-2022 academic year. The study group consists of 30 students studying in the 7th grade. Students were selected by convenient sampling method, which is not a random sampling method. The students in the experimental group received training on mind and intelligence games for two hours a week during the 8-week period. "Mathematics course academic achievement test" prepared by the researcher was used as a data collection tool. For the validity of the test, the opinions of two mathematics educators who are experts in the field were taken, and item and reliability analyzes were made for its reliability. In this study, the games were first explained and then the students were allowed to play. Accordingly, the teaching process lasted 8 weeks. As a result of the research, it was seen that the academic success of the students who received mind and intelligence games training increased.

Keywords: Mind and intelligence games course; 7th grade students, Experimental study

A New Reproducing Kernel Approach for Nonlinear Variable Order Fractional Volterra Integro-Differential Equations

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Abstract

In this article, a new reproducing kernel approach is developed for nonlinear variable order fractional Volterra integro-differential equations. The fractional derivatives are taken in the Caputo sense. This approach is based on reproducing kernel which is constructed by shifted Legendre polynomials. In order to shows the robustness of the proposed method, some examples are solved and numerical results are given in tabulated forms.

Keywords: Reproducing kernel method; Legendre polynomials; Caputo derivative; Variable order; Volterra integro-differential equations.

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EXAMINATION OF 8th GRADE STUDENTS' OPINIONS ON MODEL ELICITING ACTIVITIES

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Abstract

Many students see mathematics as a discipline separated from everyday life. In order to break this prejudice toward mathematics in students, it is very important to expose students to daily life problems that can be solved by using mathematical skills (Lesh & Zawojewsky, 2007). For this purpose, we suggested that using model eliciting activities may increase students' mathematical skills and encourage them to use mathematics in daily life.

Model eliciting activities are non-routine problem situations that can be encountered in everyday life. These problems may have different possible solutions; hence, the goal is not to conclude with a single correct answer. The purpose of these activities is to interpret a problem by using mathematics and to offer a perspective for people who may encounter the same situations (Lesh & Zawojewsky, 2007).

The aim of this study is to examine the opinions of 8th-grade students about model eliciting activities. In the scope of the research, we have studied with 10 students studying in a public school in Van, Turkey. This is a qualitative study that examines students' opinions. In the study, educational modeling activities created by Purdue University have used as a data collection tool. The students have divided into two groups and, the activities have carried out as teamwork. At the end of the activities, semi-structured interview questions have used to get individual opinions of the students and the collected data have analyzed with the descriptive analysis method. We observed that students have found model eliciting activities difficult and complex as they got used to routine problems. However, trying to create solutions via mathematics for daily life problems helped students to understand the importance of mathematics. We concluded that the model eliciting activities are important and helpful for easier learning of mathematical concepts and it can distract the lessons from monotony.

Keywords: Model eliciting activities; Teamwork

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Numerical solution of fuzzy differential equations by two-step modified Simpson rule

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Abstract

In this paper, a numerical explicit two-step modified Simpson rule for fuzzy first-order initial value problem is present, and convergence and stability of the mentioned rule are proved, and their applicability is illustrated with some examples.

Keywords: fuzzy differential equations; fuzzy Cauchy problem; two-step methods; midpoint rule; trapezoidal rule; modified Simpson rule.

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A NUMERICAL APPROACH FOR SINGULAR BOUNDARY VALUE PROBLEM

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Abstract

In this study, a numerical method is proposed to obtain an approximate solution for singular boundary value problems. The presented method is based on reproducing kernel method and Legendre polynomials. Comparison of numerical results with other methods is given by tables and graphics.

Keywords: Reproducing kernel method; Sindular boundary value problem; Legendre polynomials.

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A NEW APPROACH FOR NUMERICAL SOLUTION OF FOURTH ORDER EMDEN-FOWLER EQUATION

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Abstract

In this study, a new numerical approach will be proposed for fourth order Emden-Fowler equation. This approach is based on the reproducing kernel method with Legendre polynomials. To observe the effect of the approach numerical results will be given tables and graphics.

Keywords: Reproducing kernel method; Legendre polynomials; Fourth order Emden-Fowler equation.

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A FINITE DIFFERENCE METHOD FOR FREDHOLM INTEGRO-DIFFERENTIAL EQUATIONS

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Abstract

In this work, we study the numerical solution of a second-order linear Fredholm integro-differential equation (FIDE) by a finite difference method. The discretization of the problem is obtained by a finite difference method on a uniform mesh. We construct the method using the integral identity method with basis functions and dealing with the integral terms by interpolating quadrature rules with remainder terms. We further employ the factorization method to establish the algorithm. We demonstrate the error estimates and the convergence of the method. The numerical results are demonstrated to verify the order of accuracy.

Keywords: FIDE; Difference Scheme; Error estimates.

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Spectra of a linear pencil of pentadiagonal matrices

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Abstract

Let $c \in \mathbb{R}$, and define the pentadiagonal matrix A and the diagonal matrix B by

$$A = \begin{pmatrix} c & 1 & 1 & & & \\ 1 & c & 1 & \ddots & & \\ 1 & 1 & c & \ddots & \ddots & \\ & \ddots & \ddots & \ddots & \ddots & 1 \\ & & \ddots & \ddots & \ddots & 1 \\ & & & 1 & 1 & c \end{pmatrix}, \qquad B = \begin{pmatrix} 1 & & & & & \\ & \ddots & & & & \\ & & 1 & & & \\ & & & -1 & & \\ & & & & \ddots & \\ & & & & & -1 \end{pmatrix},$$

respectively, where the size of both matrices is $(2n)\times(2n)$, $n \in \mathbb{N}$, and the diagonal matrix B has n plus ones and n minus ones. In this research, we conduct numerical experiments to investigate the behaviour of the eigenvalues of a sign-indefinite linear pencil $P(\lambda) = A - \lambda B$. Motivated by our numerics, we pose some conjectures concerning the localization of the spectrum of $P(\lambda)$.

Keywords: Linear matrix pencils; Non-self-adjoint matrices; Complex eigenvalues; Spectral theory.

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EXAMİNİNG OF MİDDLE SCHOOL 7TH GRADE STUDENTS' PROBLEM POSİNG STATUS ABOUT 'EQUALİTY AND EQUATİON'.

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The aim of the research is to examine the problem posing status of middle school 7th grade students about 'equality and equation'. The participants of the research consist of 24 students, 17 girls and 7 boys. The Problem Posing test was used as a data collection tool. The problem posing test was developed by researchers and includes 10 problem posing activities. Problem posing activities were arranged according to Stoyanova and Ellerton's (1996) problem posing classification. The analysis of the data obtained was classified according to the problem posing classification scheme of Türnüklü et al. (2017). According to the results obtained from the research, some suggestions were presented.

Keywords: Problem posing, equality and equation

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Predictor-Corrector $(m+1)$ −step Method for Solving Fuzzy Ordinary Differential Equations by Using the Interpolation of Fuzzy Number

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Abstract

In this paper, an Adams Predictor-Corrector method $(m+1)$ −step is used to solve first-order fuzzy linear ordinary differential equations. The Predictor-Corrector method is generated by combining an explicit $(m+1)$ −step method. The convergence of these methods is proven in detail. Finally, these methods are illustrated using examples of fuzzy initial value problems.

Keywords: Predictor-Corrector method, Fuzzy number, Fuzzy differential equation, Adams-Bashforth method, Hukuhara differentiable, Adams-Moulton method

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On the stability and stabilization for the implicit differential control system in Banach spaces

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Abstract

The aim of this research is to generalize the famous General Theorem of Liapounov of the stability for the explicit systems to the form:

$$Ax'(t) = Bx(t), \quad t \geq 0,$$

using the spectral theory of the corresponding pencil of operators $\lambda A - B$. The achieved results can be applied to stabilizing the implicit control system

$$Ax'(t) = Bx(t) + Cu(t), \; t \geq 0, \; x \in X .$$

Where A, B and C are linear closed operators in X and the control space U are Banach spaces, and the function u is square integrable in the sense of Bochner. The operator A is not necessarily invertible.

Keywords: Spectral theory, stability and stabilization theory, pencil of operators, implicit systems.

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SOME NEW EXISTENCE RESULTS FOR FRACTIONAL DIFFERENTIAL INCLUSIONS WITH ANTI-PERIODIC BOUNDARY CONDITIONS

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Abstract

In this paper, the existence of anti-periodic solution for competitive neural networks with delays neural networks under the same framework. Firstly, the existence of anti-periodic solution is discussed by using the Lyapunov functional method.Then some sufficient conditions are obtained to guarantee of anti-periodic solution for such neural networks. The obtained results are new and improve some earlier publications. Finally, numerical example are given to illustrate the effectiveness of the theoretical results.

Keywords: Neural networks; Existence; Linear differential equation; Boundary conditions , Anti-periodic.

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INVESTIGATION OF SOLITARY WAVE SOLUTIONS FOR THE NONLINEAR (2 + 1) -DIMENSIONAL TYPICAL REFRACTION EQUATION

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Abstract

In this paper, the nonlinear (2 + 1) -dimensional Typical Refraction equation is discussed and new complex hyperbolic propagating wave solutions are obtained for this equation by using the $\left(\frac{G'}{G}, \frac{1}{G}\right)$ extension method. In the solutions obtained, graphs were drawn by giving special values to the parameters. The method used is ideal for achieving the goals set for this study, and the solutions obtained are different from the others and shed light on new studies..

Keywords: Extension method; Typical Refraction equation; Complex hyperbolic; wave solutions.

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Evolutionary Computation for Multi-Constrained Path Selection Algorithm on the Internet

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Abstract

This work investigates the implementation of an Evolutionary Algorithm (EA) that helps in building a path computation tool while benefiting the end-users through Loose-Source Routing. This is done in a scenario where internet tunnels are present in a part of the network topology. The paths calculated may or may not have tunnels present in them. The objective functions for optimisation will be designed based on the cost values associated with the end-to-end path. The approach avoids the need for inter-operator cooperation, although such cooperation would provide a means of extending tunnels across AS peers.

Keywords: Evolutionary Algorithm; Path Calculation; Internet Topology.

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ON NUMERICAL SOLUTION OF TWO POINT BOUNDARY VALUE PROBLEMS WITH LINEAR SHOOTING METHOD

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Abstract

A practical linear shooting method is applied to the boundary value problem because of the importance of finding the initial value problems with an accurate way in physical application. It is assumed that the shooting method is the best and easiest way to solve boundary values problems, but there are some disadvantages when using the Newton Rapson's method of counting initial values. The solutions that are available in the literature are used to verify the results. Therefore the solution that obtained using linear shooting method is aimed to be fast, and accurate for solving this type of two-point boundary value problems.

Keywords: Linear Shooting Method; Numerical Solution; Boundary Value Problems.

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PROPERLY WEARING FACE MASK DETECTION USING HYBRID DEEP AND CLASSICAL MACHINE LEARNING TECHNIQUES

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Abstract

The recent outbreak of COVID-19 around the world has caused global health catastrophe along with economic consequences. As per World Health Organization (WHO) this devastating crisis can be minimized and controlled by wearing mask properly. However, at public places or in chaos, manual check of persons wearing the masks properly or not is a hectic job and can cause panic. For such conditions, an automatic mask wearing system is desired. Therefore, this study analysed various deep learning pre-trained networks and classical machine learning algorithm that can automatically detect either a person is wearing the mask or not. For this, 40000 images are utilized to train and test four different models, namely; EfficientNetB0, InceptionV3, convolutional neural network and random forest in order to recognize facemasks in images. Besides just detecting the mask, the trained models also detect either the person is wearing the mask properly (covering nose and mouth), partially (mouth only), or wearing inappropriately (not covering nose and mouth). Experimental work reveals that InceptionV3 outperformed all three by attaining an overall accuracy of 98.40% and precision, recall, and F1-score of 98.30%.

Keywords: Deep learning; inappropriate wearing; machine learning; mask detection.

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AUTOMATIC NOISE DETECTION SYSTEM IN QR CODES

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Abstract

The resuscitation of the quick-response (QR) Code has been made possible in recent years by the expansion of mobile network coverage mixed with an increase in smartphone online content. They have become much more accessible as a result of the integration of a Code reader into smart devices, which has eliminated some inconvenient procedures and provided faster access to critical information. However, due to printer processes and limited printing technology, noise in printed images is unavoidable, which may reduce the quality of a QR code image during digital image collection and transfer, resulting in failure while scanning and extracting actual information. For this, a new dataset containing 20000 photos of original QR codes and noisy QR codes was created. Later, we used two well-known machine-learning classifiers and an advanced deep learning algorithm to separate noisy photos from original QR code images that includes convolutional neural network (CNN), support vector machine (SVM) and logistic regression. The experimental results demonstrate that CNN performed worst, while LG attained an overall accuracy of 97.25%, whereas SVM outperformed with 97.5% accuracy.

Keywords: noisy images, quick-response code, noise identification, CNN, SVM, logistic regression.

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THE MATHEMATICAL MIRACLE OF AN 80 MINUTE MEMORY

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Abstract

Born in Okayama in 1962 and actually graduated from Waseda University's Faculty of Letters, Yoko Ogawa is one of the prominent writers of Japanese literature. The author, who has more than thirty novels and stories, publishes a novel called "The Formula That The Professor Falls In Love", which was adapted to Japanese cinema in 2003. Pınar Demircan translated this highly acclaimed novel into Turkish in 2014 as *Housekeeper and the Professor* The novel is also interesting in that it shows Ogawa's mastery of mathematics, who is actually a literary man.

Housekeeper and the Professor is about the interesting and dramatic life of a mathematical genius who has been in a serious car accident and has to live with only the last 80 minutes of his memory. Finally, a maid with a ten-year-old child adapts and starts looking after the professor who is in need of care and does not rely on a maid. One of the most interesting aspects of the professor, who has a memory of 80 minutes and does not remember what he ate even for breakfast, is that his brain works miraculously when it comes to mathematical equations. The novel is also notable for instilling a love of mathematics in the professor, who establishes a warm bond with the ten-year-old boy.

***Keywords**:* Japanese literature, Yoko Ogawa, mathematics, novel, *Housekeeper and the Professor*

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THE GROUP LAWS ON THE ALGEBRAIC CURVES

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Abstract

In Algebraic Geometry, The Elliptic Curves is a smooth, projective and plane algebraic curves. The Elliptic Curve Cryptography (ECC) which independently proposeed Neal Koblitz and Victor Miller using the multiplicative group law on the elliptic curves [3-4]. It having been playing important role in public-key cryptogtaphy and traditionally are used in digital signature and in crypto currency. In this study we give properties the adding point on elliptic curve and invetigate the group law on the algebraic curves in plane.

Keywords: Algebraic curves, Elliptic curve, Cryptography.

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ON A STURM-LIOUVILLE FUZZY PROBLEM

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Abstract

In this paper, we investigate the fuzzy eigenvalues and fuzzy eigenfunctions of a Sturm-Liouville fuzzy problem with fuzzy eigenvalue parameter in the boundary condition. Some properties of the problem are given. Several examples are solved.

Keywords: Sturm-Liouville fuzzy problem; Fuzzy eigenvalue; Fuzzy eigenfunction.

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SOME PROPERTIES ON POINTWISE SEMI-SLANT RIEMANNIAN MAPS (PSSRM)

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Abstract

In this paper, we define and study a new class of Riemannian maps which is called *pointwise semi-slant Riemannian maps* from a Riemannian manifold to an almost Hermitian manifolds as a generalization of slant submanifolds, slant submersions, slant Riemannian maps, semi-slant submanifolds, semi-slant submersions, semi-slant Riemannian maps and pointwise slant Riemannian maps. We give many examples and investigate the geometry of total space, base space and the fibres.

Keywords: Riemannian maps; Semi-slant Riemannian maps; Pointwise semi-slant Riemannian maps; Second fundamental form of a map.

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FRACTIONAL INVARIANTS OF CURVES IN LORENTZIAN PLANE

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Abstract

In this study, curves in the Lorentzian plane are discussed. By considering a spacelike (or timelike) curve in the Lorentzian plane, fractional invariants of a spacelike (or timelike) curve are given.

Keywords: Fractional derivative; Lorentzian plane; Frenet-Serret formulas.

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SOME PROPERTIES OF CURVES WITH FRACTIONAL DERIVATIVE IN EUCLIDEAN SPACES

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Abstract

In this presentation, a curve in n-dimensional Euclidean space is taken and the fractional derivative invariants of this curve are investigated. Later, these invariants are compared with the derivative results in the classical sense.

Keywords: Fractional derivative; Euclidean space; Frenet Formulas.

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Notes on Surfaces with Constant Mean Curvature along a given Curve in the Lie Group

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Abstract

In this study, surfaces as linear combinations of the isoparametric curves and special Smarandache curves and their Frenet frames, respectively, are defined in the 3-dimensional Lie group. Then sufficient conditions when surfaces have constant mean curvature along the given curve are provided. Finally, examples of our results are given.

Keywords: Constant mean curvature; Lie group; Surfaces

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Big Data Analytics via Penalized Estimation

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Abstract

We consider efficient estimation and prediction strategies for the classical multiple regression model with High Dimensional data when the dimensions of the parameters are larger than the number of observations. In this case, a number of existing penalized estimation techniques exists. However, they focus on selection variables with different number of predictors. Generally, the least absolute shrinkage and selection operator (Lasso) and Elastic Net approaches produce an over-fitted model compared with its competitors, namely the smoothly clipped absolute deviation (SCAD) method and adaptive Lasso (aLasso). Thus, prediction based only on a sub model selected by such methods will be subject to selection bias. To tackle with this problem, we suggest a shrinkage estimation that is combining two techniques, where one includes more predictors than the other based on relatively aggressive variable selection strategies, to improve the estimation and prediction performance. A Monte Carlo simulation study is carried out using the relative mean squared error (RMSE) criterion to appraise the performance of the listed estimators. The proposed strategy is applied to the analysis of a few real high-dimensional data sets.

Keywords: Sparse Regression Model; Penalized Estimation; High Dimensional Data

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Numerical Dynamics of Variable Order Fractional Benney-Lin Equation via Finite Element Collocation Method

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Abstract

The aim of this paper is to focus a numerical study on variable order fractional Benney-Lin equation which specifically describes the propagation of long waves on thin film. The method is based on Finite element collocation method with selection of basis functions as trigonometric quintic B-splines. With the idea of using less order basis, the Benney-Lin equation transformed to couple system via auxiliary variable. The Finite element collocation method through satisfying boundary conditions and continuity conditions, yields the equation convert to an algebraic system of equations whose solutions generates the approximate solution for fractional Benney-Lin equation. The effectiveness and efficient of the method is tested via some illustrative examples.

Keywords: Variable order fractional Benney-Lin equation; Collocation method; Trigonometric quintic B-splines

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COMPLEX TRANSFORM METHOD FOR SYSTEM OF FRACTIONAL DIFFERENTIAL EQUATIONS AND APPLICATIONS

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Abstract

The complex transform method for solving system of the system of fractional differential equations introduced. We applied complex transform method for solving a system appeared in the dynamics of the drug therapy efficiently. Various examples shows that these methods are effective and efficient.
Keywords: Complex Transform method, Fractional calculus, System of fractional differential equations, Riemann-Liouville fractional derivative.

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BLOCKCHAIN-BASED SERVICE NETWORK PORTAL

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Abstract

Blockchain-based Service Network (BSN) is a worldwide infrastructure network that provides developers and companies a one-stop-shop solution for blockchain and distributed ledger technology applications, that can operate together within one environment. Red Date Technology, the architect of BSN, signed an agreement with Turkey-China Economic Twinning Center (TUCEM) in order to establish an international BSN portal in Turkey, which is Turkey's first blockchain-based service network. By means of the blockchain-based service network provided by BSN, the users can run and install all kinds of distributed applications and the developers can build and deploy decentralized applications at low cost.

In this study, the new BSN portal developed to offer "blockchain as a service (BaaS)" in Turkey is presented. User Interface is developed with React.js, the backend is developed with .Netcore and PostgreSQL is used for database management.

Keywords: Blockchain; Blockchain-based Service Network; Blockchain as a service (BaaS).

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Relative TL Bi-Ideal, TL Quasi Ideal, TL Interior Ideal

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Abstract

In this paper, we introduce the notions of $TL-$bi ideals, $TL-$quasi ideals and $TL-$interior ideals in a semigroup, develop some properties of them. We also build the relation between $L-$ideals of a semigroups and TL-ideals of a TL subsemigroups. Furthermore, the lattice structure of TL bi ideal, TL quasi ideal, TL –interior ideal of a TL subsemigroups are studied.

Keywords: Semigroup,relative ideal,t-norm ,bi-ideal,quasi ideal.

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A MATHEMATICAL EXAMINATION OF THE FRACTIONAL HIV INFECTION MODEL

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Abstract

The objective of this study is to investigate the HIV infection model by means of the Caputo fractional differential operator. We present some crucial theoretical results and basic aspects of the non-integer order disease model under consideration. Moreover, the dynamic behavior of the system is analyzed in detail with the help of a convenient numerical scheme based on the Caputo operator. On the other hand, we employ the non-linear least squares curve fitting method in order to estimate the parameters of the suggested model under real-world data of Turkey.

Keywords: Fractional modeling, HIV infection, Mathematical biology, Caputo operator.

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A numerical stochastic computing paradigms for the nonlinear singular delay differential problems

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Abstract

The aim of this work is to present a computational intelligence procedure for solving the nonlinear singular delay differential problems. The stochastic procedures are adopted by using the strength of artificial neural networks (ANNs), together with the optimization schemes of global search genetic algorithm and local search active set programming. An objective function is designed by using the sense of differential singular delay differential model and its boundary conditions. The optimization of this objective function is performed through the hybridization of the global and local search schemes. The objective for presenting this research is to provide the reliable structure of the ANNs to deal with such stiff nonlinear, singular based on the delay differential models.

Keywords: Delay models, singular, nonlinear, active-set programming, genetic algorithm, statistical analysis

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Artificial intelligence for real-time defect detection and inspection of photovoltaic panels

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Abstract

Photovoltaic installations can be a lucrative investment. To maximise production and income over decades, however, you need to focus on quality. The solar module, the key element of these installations, must be reliable, producing electricity continuously for years. However, they are confronted with different types of failures. Therefore, the introduction of intelligent devices for real-time inspection and monitoring of photovoltaic panels is a hot topic. In this paper, we propose an intelligent monitoring system based on visual data acquired by thermal cameras connected with microcontrollers equipped with our own convolutional neural network model to detect and process hot spots using Tensorflow and Keras resulting in an intelligent and real-time inspection of large solar farms.

Keywords: Artificial intelligence; convolutional neural network ; photovoltaic panels; fault detection; real –time monitoring.

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The nonlinear fractional generalised Pochhammer-Chree equation arising an electrical field theory is Dynamical Analysis of Caputo-Fabrizio fractional derivative

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Abstract

In this manuscript, an efficient numerical technique called the fractional homotopy perturbation transform method (FHPTM) is presented for solving the nonlinear fractional generalized Pochhammer-Chree equation. The basic concepts for fractional derivatives are defined in Caputo Fabrizio. An existence and uniqueness analysis of the considered mathematical model is provided. To present the physical representation, several cases are given, and the findings are illustrated by certain surface plots. The findings suggest that the new methodology is prolific, powerful, efficient, and simple to apply, as well as capable of incorporating a wide range of partial fractional differential equations.

Keywords: Homotopy perturbation transform method; Caputo fabrizio derivative; Laplace transform; generalized Pochhammer-Chree equation; Fractional differential equations

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EXACT SOLUTIONS OF GOURSAT PROBLEMS INVOLVING MIXED PARTIAL DERIVATIVES VIA HOMOTOPY ANALYSIS METHOD

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Abstract

The present research explores, the Homotopy analysis method (HAM) is tested by performing it to obtain the exact solutions for the Goursat problems involving mixed partial derivatives. We carry out the computations, tables and draw the 2D and 3D graphs in this paper with the help of a ready-made package program. Additionaly, gained results and numerical simulations emphasize the forcefulness of the proposed method.

Keywords: Homotopy analysis method; Mixed partial derivatives; Goursat problems; Nonlinear.

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ON $\rho-$ STATISTICAL CONVERGENCE OF DOUBLE SEQUENCES OF ORDER α IN TOPOLOGICAL GROUPS

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Abstract

In this study, by using definition of ρ-statistical convergence which was defined by Çakallı [1], we give some inclusion relations between the concepts of ρ-statistical convergence and statistical convergence of double sequences of order α in topological groups.

Keywords: Topological groups; Statistical convergence; ρ-statistical convergence.

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INVESTIGATION OF THE EFFECTS OF AMBİENT VIBRATIONS FILTERED AT DIFFERENT FREQUENCY RANGE ON THE DYNAMIC BEHAVIOR OF THE BUILDING

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Abstract

Ambient vibrations, which are constantly and intensely felt in buildings, significantly affect the dynamic properties of the building such as the natural dominant period, damping ratio, floor displacements and accelerations that change over time. Ambient vibrations caused by explosions, the passage of heavy vehicles and heavy human and vehicle traffic are recorded with sensors such as accelerometers and speedometers. Otherwise, considering the vibrations that are not related to the structure in the estimation of the dynamic behavior of the structure may lead to incorrect calculations. In this study, ambient vibrations taken from a structure using accelerometers with a measurement capacity of 3g acceleration and frequency ranges of 0.1-50 Hz were filtered in the frequency range of 0.1-50 Hz, 0.1-25 Hz and 0.1-50 Hz with bandpass filtering technique and used in structural analysis. In order to investigation the effect of filtered ambient vibrations in the study, a 9 m high steel state structure with 1 opening in the X direction and 7 spans in the Y direction with heavy traffic and noise flow was used. In order to represent the ambient vibrations in the structure, so-called acceleration-frequency curves were drawn and modal parameters were determined. By using the filtered ambient vibrations, the dynamic responses of the structure are calculated and the structural damping, structure acceleration and displacements are approximately calculated. The results of the study show that filtering in the 0.1-25 Hz frequency range is more appropriate in order to see the suitability of the structure in terms of dynamic behavior and the effects of modes such as bending, torsion and lateral torsional buckling. However, it is predicted that these frequency ranges may change in structures with different span distances and heights. The study showed that correct filtering and frequency ranges should be applied in order to determine the dynamic behavior of a structure under the influence of ambient vibrations.

Keywords: Ambient vibrations; Filtration; Frequency time domain; Structural dynamic behavior.

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ENERGY BASED EVALUATION OF REINFORCED CONCRETE STRUCTURE AFFORDABLE BY FAR FIELD EARTHQUAKE

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Abstract

In today's Standards, many methods are used for the structural evaluation of reinforced concrete buildings, such as non-linear analysis in the time integration, unimodal and multimodal static pushover analysis, and summing of modes. In the literature, the evaluation of energy-based structures is a subject that has not been studied much. In addition, the criteria for this method are not specified in any Standard. The energy-based evaluation method is compared with the capacity curve of the structure (base shear force-peak displacement curve) by calculating the input energies to be generated by the earthquake in the building. If the earthquake energy demands in the building remain below this capacity curve, the damage levels are not foreseen for the building, but if it stays above the capacity curves, it is based on the principle that damage to the structure is likely to occur. The input energy of the earthquake can be dissipated with the plastic deformations that the structures can make without collapse, the kinetic energy depending on the mass of the structure in the elastic region, and the energy dissipated by viscous damping. In this study, the energy capacity of a 4-storey reinforced concrete structure, which does not have the risk of soil amplification, at 39.9026 Latitude and 41.2498 Longitude coordinates, was calculated by obtaining the base shear force - peak displacement curve using the pushover analysis method. Then, the minimum and maximum earthquakes in 2020 and 2021 affecting the structure were given as input, and the demand energies created by the earthquakes in the structure were calculated. By showing how much of these earthquake energies the building can dissipate, damage ındex were determined and the damage levels of the building were determined. In the calculation of the demand energies of the earthquake, the analysis method in the time domain defined in the Turkish Building Earthquake Code 2018 was applied. At the end of the study, the amount of energy required to be stored in the structure is shown in order to distribute the energy of an earthquake without damaging the structure.

Keywords: Earthquake ınput energy; Reinforced structure; Energy- based structural assesment; Damage ındex

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Tauberian theorems for the statistically $(\overline{N}, p)$ summable integrals

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Abstract. In this paper we consider the Tauberian conditions of slow decrease and slow oscillation with respect to P, where P is an indefinite Lebesgue integral of a locally integrable positive weight function. We prove that these are sufficient conditions to obtain ordinary limit at infinity of a real- or complex-valued measurable function from the existence of its statistical limit at infinity. Furthermore it is proved that ordinary limit of an integral function follows from the existence of statistical limit of its weighted mean at infinity.

Keywords: Tauberian theorems, Statistical convergence, Weighted mean method of integrals, Slowly decreasing and oscillating functions

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DIRECT INTEGRATION OF THE SYSTEMS OF LINEAR DIFFERENTIAL EQUATIONS AND SOME APPLICATIONS IN ECONOMICS

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Abstract

Differential equations play an important role in many disciplines, including engineering, physics, economics, and biology, because studying the relationship between quantities and their rates of change, which are expressed by derivatives, is an important scientific task. In the course of ordinary differential equations, when studying linear systems, one usually studies the methods of Leonhard Euler (1707 – 1783) and, sometimes, Jean Léron d'Alembert (1717 - 1783). A combination of these methods, involving the use of characteristic numbers to obtain integrable combinations, as shown in the works of the authors of the report, generates a synergy effect — significantly simplify the solution process. As a result, the direct integration method turns out to be a very convenient tool for studying applied problems. In this paper, the emphasis is on applications in economics.

Keywords: Linear ordinary differential equations, solution of systems of linear equations, characteristic numbers, integrable combinations, integrability by quadrature.

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Some special Smarandache Ruled Surfaces according to Frenet Frame in E^3 -III

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Abstract.
In this study, firstly, Smarandache curves were defined using Frenet vectors of a curve and Darboux vector. Then, Gaussian and average curvature of ruled surfaces formed by the vectors obtained from Frenet and Darboux vectors along Smarandache curves are calculated separately and openability conditions are given. Finally, the ruled surfaces obtained by using the Vivian curve were drawn with the maple 17 program.

Key Words: Smarandache ruled surfaces, mean curvature, Gaussian curvature, vivian curve

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Machine Learning based Intrusion Detection System using Gray Wolf Optimization for Feature Selection

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Abstract

In the age of information and technology, heterogeneous devices constantly connected to each other share information between different applications and generate large amounts of data traffic. It is important to ensure that this traffic, which occupies an important place in the digital workflow, is not disrupted and that cybersecurity is ensured. Network-based attacks are an important part of cybersecurity issues. Since conventional signature-based intrusion detection systems cannot detect zero-day attacks, machine learning algorithms have been widely used in this field.

In this paper, we propose a model using the AdaBoost ensemble classifier and grey wolf optimization algorithm for feature selection to detect attacks that threaten network security.

As a result of the training and testing studies on the NSL-KDD dataset, an accuracy rate of 89.21% was achieved.

Keywords: Intrusion detection, Network Security, Machine Learning, Grey Wolf Optimization

1.INTRODUCTION

2.GENERAL PROPERTIES OF METHOD

3.APPLICATIONS

4.CONCLUSIONS

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On Ruled Surfaces Generated by Direction Curves with Sannia Frame and Their Characterizations

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Abstract

In this study, direction curves are defined in 3-dimensional Euclidean space using the Sannia frame defined on the striction curve of the ruled surface. The characterizations of these curves in the case of planar, Salkowski, anti-Salkowski, and general helix are given. Afterward, the relations between the Frenet vectors and the curvatures of these direction curves are found. Then ruled surfaces whose base curves are the direction curves and the director curves are the vector fields of the direction curves are characterized. In addition, examples of these surfaces and curves are given and their graphs are drawn.

Keywords: Ruled surface; Sannia frame; Direction curve; Striction curve.

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A Study on Inextensible Flows of Polynomial Curves with Flc Frame

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Abstract

In this paper, we investigate the inextensible flows of polynomial space curves in IR^3 . We calculate that the necessary and sufficient conditions for an inextensible curve flow are represented as a partial differential equation involving the curvatures. Also, we expressed the time evolution of the Frenet like curve (Flc) frame. Finally, an example of the evolution of the polynomial curve with Flc frame is given and graphed.

Keywords: Flc frame; Polynomial curves; Inextensible curve; Flow; Evolution.

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EIGENFUNCTION EXPANSIONS FOR A STURM-LIOUVILLE OPERATOR FOR THE CASE OF AN INFINITE INTERVAL

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Abstract

A Sturm-Liouville problem is said to be regular if the interval [a,b] is finite and the function *q(x)* is summable over this interval. In the contrary case, i.e. if the interval [a,b] is finite or the function *q(x)* is not summable over [a,b] (or both), then Sturm-Liouville problem is said to be singular.

We obtained the expansion theorem for a regular Sturm-Liouville problem by means of a passage to the limit, replacing the differential equation by a finite-differance equation.

A similar idea makes it possible to obtain the expansion theorem for a singular problem, if we consider it as the limit of regular problems.

We will start by considering the case in which the interval is the halfline [0, ∞), and the function *q(x)* is continuous on this interval.

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Keywords: Expansıons Functıons of Sturm-Lıouville.

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Application of a Genetic Algorithm for Generating Regular and Irregular Natural Fractal Patterns

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Abstract

This work aims to describe the successful implementation of a Genetic Algorithm (GA) as a search and optimisation tool for the fractal patterns observed in nature. This will involve designing a method for calculating fractal dimensions based on parameter values of the fractal-generating functions. These values will be evolved and optimised using a standard GA. The fact that Genetic Algorithms are closely associated with nature, has been the main motivation behind this work since the natural complex patterns are the most common fractals. However, we aim to optimise both self-similar and irregular fractal patterns using GA.

Keywords: Genetic Algorithm; Fractal Patterns; Optimisation.

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Neimark-Sacker bifurcation in a prey-predator model with conformable fractional derivative

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Abstract

Using bifurcation analysis is a very effective method to better understand the dynamic behavior of competitive models. Recently, many researchers have studied the bifurcation theory[1-3]. In this paper, we examine Neimar-Sacker bifurcation of a prey-predator model with conformable fractional derivative using the center manifold theorem and bifurcation theory. In addition, the effect of fractional order derivative on dynamic behavior of the model is investigated. Finally, all theoretical results are supported by numerical simulations.

Keywords: Conformable fractional derivative; Discretization; Stability; Bifurcation.

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DIVERSITY ANALYSING OF RAPHIGNATHOID MITES (ACARI: RAPHIGNATHOIDEA) INHABITING PÜLÜMÜR VALLEY AND ITS SURROUNDINGS

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Abstract

Mites (Acari), one of the main components of biodiversity, are in strong interaction with other ecosystem elements, and are important indicators of deterioration in both aquatic and terrestrial systems (Walter and Proctor, 2013). In the present work, Raphignathoidea species in Pülümür Valley and its surroundings located at the provincial borders of Tunceli, Turkey were investigated. Raphignathoid mites have a wide distribution and especially prefer terrestrial habitats such as plant debris, moss, lichen, tree bark and hollows. During this work, a total of 70 mite species belonging to 6 families were identified from the research area, and the diversity of these mites according to habitat type, season and altitude were analysed by using a software tool Estimating Biodiversity Components (BİÇEB) designed by Özkan et al. (2020).

Keywords: BİÇEB; Index; Measurement of diversity; Mite; Raphignathoidea; Turkey.

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