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FACULTY OF ARTS AND SCIENCES

KOCAELİ SCIENCE CONGRESS

2-4 OCTOBER 2024
KOCAELİ UNIVERSITY

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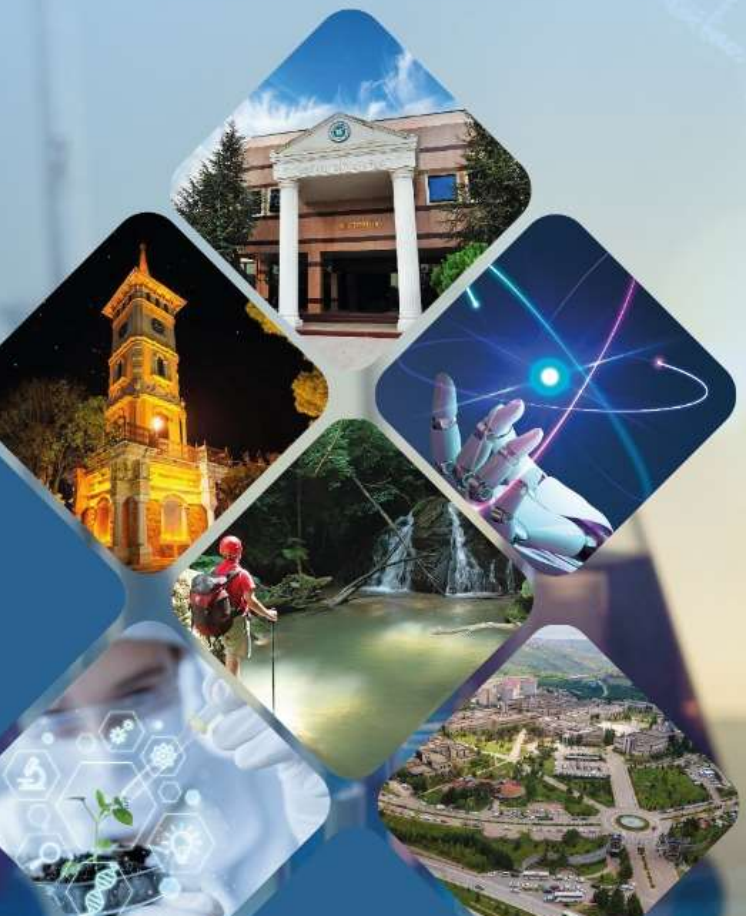
BOOK OF ABSTRACTS



KOCAELİ SCIENCE CONGRESS

(KOSC-2024)

BOOK OF ABSTRACTS

KOCAELİ SCIENCE CONGRESS (KOSC-2024) SUPPORTED BY
KOCAELI UNIVERSITY AND PETROYAG GROUP

KOCAELİ, 2024

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CONTENTS

KEYNOTE PRESENTATIONS

Synthesis of UV Curable Functional Resins

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Article Info

Oral Presentation

Keywords

Electron Beam Curable
Epoxy Acrylate
Hybrid Resin
Polyester Acrylate
UV Curable

Abstract

Polyester and epoxy resins commonly used today have disadvantages such as containing volatile solvents that are harmful to health as diluents, long curing times and high energy requirements for curing. However, thanks to UV-curable resins, it is possible to achieve high-efficiency polymerization in very short periods of time such as 5 seconds with LED light sources that consume very little energy. In addition, since these resins do not contain volatile solvents, they are more sensitive to the environment and human health. The use of a photoinitiator to produce free radicals or protonic acids with a UV energy source forms the basis of the UV curing process. This technology, which requires little energy, provides cold curing and is environmentally friendly, continues to leave traditional solvent-based resin technology behind. UV light curing technology is currently used in coatings, graphic arts, 3D printers, metal decoration, adhesives, dentistry, cosmetics, processes requiring biocompatibility and many other areas. The first and fundamental step in the UV curing process is the absorption of UV energy in the form of light. The photoinitiator added to the resin formulation is designed to perform this absorption and forms a reactive structure by being affected by photons or light energy packets. The resulting free radical or cationic groups then initiate a polymerization process depending on the chemistry of the monomers and oligomers used. In this project; functional and innovative polyester acrylate and epoxyacrylate resins that can be cured with UV and electron beam were synthesized.

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Development of Biobased Polyester Resin

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Article Info

Oral Presentation

Keywords

Biobased Polyester Resin
Fossil Fuels
Renewable Resources
Sustainability
Thermoset Resin

Abstract

Today, more than 90% of the world's organic chemicals and 80% of energy are obtained solely from fossil fuels. If the current rate of use continues, it is assumed that fossil fuel resources will steadily increase and reach approximately 28,000 megatons by 2050. The importance of using natural resources to make the changing world sustainable cannot be denied. Since increasing environmental events such as global warming, melting glaciers in the poles, and greenhouse gases threaten our future, the need for applications that do not harm the environment is increasing day by day. As concerns about the pollution of petrochemicals spread, sustainability and carbon footprint sensitivity have increased greatly in recent years, and bio-based thermosets obtained from renewable resources have become a solution in the chemical industries. Thermoset resins are generally used in the production of fiber-reinforced polymers (FRP) for various industries such as construction, automobiles, aviation, marine, and wind turbines. Materials obtained from renewable resources are emerging as a replacement for the starting materials of petroleum-derived plastics. Within the scope of this study, 45% biobased polyester resin synthesis was carried out in order to contribute to the circular economy by developing sustainable products and to evaluate recycled materials. The synthesized biobased resin has lower viscosity, higher solid content and higher mechanical properties compared to petroleum-based resins. In the near future, thanks to the monomer structure of biobased resins, it will be possible to use them in many materials such as sinks, shower cabins, including kitchen countertops that come into contact with food.

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ORAL PRESENTATIONS

Poly(ε-Caprolactone-co-Lactic Acid)/PEG – Lithium Salt Electrolytes For Lithium-Ion Batteries

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Article Info

Oral Presentation

Keywords

Biodegradable Polymer
Blend Polymer
Lithium-polymer Battery
Polymer Electrolyte

Abstract

Lithium polymer batteries have a growing interest in being lightweight, safe and portable. For this reason, intensive studies are carried out on the lithium polymer battery, especially in the field of solid polymer electrolyte. The common goal of the studies is to develop and produce solid polymer electrolytes that do not damage the high thermal stability, mechanical strength, high energy and most importantly environment, and to create battery systems compatible with these electrolytes.

The objective of this study is to prepare polymer electrolytes by synthesizing new environmentally sensitive polymers and mixing them with lithium salts and to determine whether the electrolytes prepared by examining the physical, chemical and electrochemical properties of these electrolytes are suitable for use in lithium polymer batteries. In order to achieve this objective we synthesized poly(ε-caprolactone-co-lactic acid) copolymer by ring opening polymerization (ROP) method. After purification process resulting polymer was mixed with different ratios of poly(ethyleneglycol) (PEG) and lithium perchlorate salt ($LiClO_4$) to form poly(ε-caprolactone-lactic acid)/PEG lithium salt electrolyte. The physical and chemical properties of the polymer electrolyte were characterized using FT-IR, ^{1}H-NMR, GPC, DSC, SEM and TGA. Electrochemical characterization was performed using electrochemical impedance spectroscopy and cyclic voltammetry tests.

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A Study on the Performance of Photovoltaic Panels Dated April 6, 2023

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Article Info

Oral Presentation

Keywords

Bifacial Panels
Building-Integrated Photovoltaic
Energy Efficiency
Photovoltaic Panels
Solar Radiation
Systems (BIPV)

Abstract

This study examines the energy production performances of photovoltaic (PV) panels placed in different orientations based on data collected on April 6, 2023, in Şanlıurfa. The performance of bifacial (dual-sided) and monofacial (single-sided) panels was compared, and their efficiencies in different orientations were analyzed.

The panel placed on the east-facing side achieved the highest energy production early in the morning; however, this production decreased as the day progressed and the sun changed its position. The rooftop panel reached its maximum energy production during the midday hours when sunlight was at a perpendicular angle, demonstrating the rooftop's potential for efficiently collecting solar energy.
The bifacial panel placed on the south-facing side produced 17.5% more energy compared to the monofacial panel, thanks to the additional radiation it received from its rear surface. These findings indicate that bifacial panels offer higher efficiency and are a suitable option for optimizing energy production. The study also obtained results consistent with similar research in the literature, confirming that these panels operate more efficiently under high albedo conditions.

In conclusion, this study highlights the superiority of bifacial panels in enhancing energy production potential and suggests that these panels should be preferred in PV systems.

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Investigation of Electronic and Spectroscopic Properties of 2-(3-formyl-1H-indol-1-yl) Propanoic Acid Molecule, an Indole Derivative, Using Density Functional Theory (DFT)

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Article Info

Oral Presentation

Keywords

2-(3-formyl-1H-indol-1-yl)Propanoic Acid
DFT
Electronic Properties
IR
NMR
UV-Vis

Abstract

This study investigates the electronic and spectroscopic properties of 2-(3-formyl-1H-indol-1-yl) propanoic acid, an indole derivative, used as core structures in various pharmacological drug fields. The title molecule's conformer structures were determined using MMFF theory in the Spartan08 program, resulting in 10 structures, with the lowest energy and highest Boltzmann distribution selected for the DFT calculations. Optimization, electronic, and spectroscopic properties were calculated with the DFT/B3LYP/6-311++G(d,p) level of theory. The HOMO and LUMO orbital energy values were calculated as -6.28 and 1.68 eV. The gap and global hardness values were found to be 4.60 and 2.30 eV. According to APT, Hirshfeld, and NBO charge analyses, the atoms located in the electrophilic region are found as O_1, O_2, O_3, and N_4 atoms. In the MEP map, the most negative atom was found to be O_3. The stretching vibration values in regions with a high probability of reaction were calculated at 3758 (O-H), 1815, and 1733 (C=O) cm^{-1}. The C-N stretching vibration was found at 1389 cm^{-1}. ^1H NMR values for H_{26} and H_{27} atoms in the electrophilic region were calculated as 10.8 and 6.51 ppm. In UV-Vis analysis, absorption peaks originating from HOMO/LUMO and HOMO/LUMO+4 transitions were observed at 303 and 211 nm.

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On Some Symmetries in 4-Dimensional Manifolds of Neutral Signature and Their Applications to Ricci Solitons

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Article Info

Oral Presentation

Keywords

Holonomy
Neutral Signature
Ricci Soliton
Symmetry
Vector Field

Abstract

In this work, the concept of symmetry, which has an important place in both mathematics and physics, is considered on 4-dimensional manifolds admitting a metric of neutral signature. Some special symmetries are studied in this context and their connections with Ricci solitons are investigated on these manifolds. The theory of holonomy is used in this investigation and some results are obtained on the holonomy types for the neutral metric. In particular, studies are made on proper affine vector fields, and various examples are constructed, including a shrinking Ricci soliton example. The obtained examples are also related to the Segre type of the Ricci tensor for the relevant metric signature and the dimension of the Killing algebra is also determined.

Acknowledgments: This study was supported by the Scientific and Technological Research Council of Türkiye (TÜBİTAK) under Grant Number 122F478. The author thanks TÜBİTAK for their support.

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A Comprehensive Analysis for Weakly Singular Nonlinear Functional Volterra Integral Equations Using Discretization Techniques

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Article Info

Oral Presentation

Keywords

Fixed Point Theorem
Functional Integral Equations
Grönwall Inequality
Nonlinear Integral Equations
Trapezoidal and Euler Methods

Abstract

This study investigates weakly singular nonlinear functional Volterra integral equations (WSNFVIEs) of Urysohn type involving Riemann–Liouville operator. By imposing specific smoothness conditions on the involved functions, we establish both the existence and uniqueness of the solution using a fixed point approach. Subsequently, we employ discretization methods such as the trapezoidal and Euler methods to approximate the solution, resulting in a system of nonlinear algebraic equations. To ascertain the convergence order of the Euler method (first order) and the trapezoidal method (second order), we utilize the Grönwall inequality and its discrete counterpart. Additionally, we introduce a novel Grönwall inequality to establish the convergence of the trapezoidal method. Thoroughly we examine the Hyers–Ulam–Rassias and Hyers–Ulam stability of the integral equations within the specified domain. Finally, the efficacy of the proposed methods is validated through numerical examples accompanied by comparative analyses.

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Approximation Properties of Residual Neural Networks for Fractional Differential Equations

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Article Info

Oral Presentation

Keywords

Approximate Solutions
Fractional Differential Equations
Residual Networks
Variational Iteration Method

Abstract

This study talks about the first rigorous evidence that, for a class of fractional differential equations, residual networks (ResNets) can approximate their solutions and that the number of parameters in these ResNets can have an upper bound. The variational iteration method is the foundation of our proof. More specifically, we demonstrate that the format derived from the variational iteration approach roughly represents the solutions to these equations, and we then demonstrate that ResNets can approximate the format.

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Certain New Generalized Fractional Hermite-Hadamard Type Inequalities for Twice Differentiable Functions

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Article Info

Oral Presentation

Keywords

Caputao-Fabrizio Fractional Integrals
Midpoint Type Inequality
Trapezoid Type Inequality

Abstract

Integral inequalities involving fractional operators have also been an active area of research. These inequalities play a crucial role in establishing bounds, estimates, and stability conditions for solutions to fractional integrals. I will investigate a unified approach, specifically for the midpoint and trapezoid rules, and discuss how to obtain these inequalities for s-convex functions. Moreover, I will explore their versions in fractional integrals, showcasing their flexibility in handling diverse fractional calculus operations. Furthermore, by using different values of the parameter, we obtain Simpson's type inequalities.

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Some New Parameterized Fractional Inequalities for Hermite-Hadamard Type with Application

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Article Info

Oral Presentation

Keywords

FractionalIntegral
Hermite-HadamardTypeInequality
ParameterizedFractionalInequality

Abstract

Overall, the ongoing interest in the use of fractional operators in integral inequalities reflects their importance and potential for advancing mathematical theory and its applications across multiple disciplines. The paper introduces fractional Hermite-Hadamard-type inequalities that are parameterized. These inequalities are derived for functions whose third derivative absolute values exhibit quasi-convexity. By assigning specific values to the parameter in the fractional parameterized inequalities, the paper presents several new results for Hermite-Hadamard-type inequalities. These results include both novel findings and previously known results, as indicated by Corollaries 1, and 2-7. Additionally, the paper explores an application of the derived inequalities to special means of real numbers.

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The Concept of 2-Normed Structures on Soft Vector Spaces

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Article Info

Oral Presentation

Keywords

Cauchy-SchwarzInequality
CauchySequences
Soft 2-bilinear Functional
Soft 2-inner Product Space
Soft 2-normed Space
ParallelogramLaw

Abstract

This study introduces the concept of a soft 2-normed space. The concepts of Cauchy sequences and convergent sequences in soft 2-normed spaces have been considered. It has been demonstrated that every convergent sequence is a Cauchy sequence in 2-normed spaces. Furthermore, it has been demonstrated that a convergent sequence possesses a unique limit. Additionally, the concept of a soft 2-inner product space has been introduced and its important properties have been examined. This has been followed by the demonstration of the Cauchy-Schwarz Inequality and the Parallelogram law within these spaces and the convergence of sequences in a soft. The analysis of a 2-inner product space is presented. Subsequently, the definition of the soft 2-bilinear functional is provided. From these definitions, we can derive the definitions of orthogonality and b-best approximation.

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An Innovative Methodology for the Analysis of Hesitant Fuzzy Soft Topological Spaces

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Article Info

Oral Presentation

Keywords

HesitantFuzzySoftContinuousMapping
HesitantFuzzySoftSets
HesitantFuzzySoftTopology
Intersection, Union,
andComplementOperations

Abstract

This study defines hesitant fuzzy soft sets and provides definitions and analyses of the subset, intersection, union, and complement operations on these sets. Furthermore, the union and intersection operations on the family of hesitant fuzzy soft sets are also defined. The remainder of this paper will present the concept of hesitant fuzzy soft topology. Subsequently, the definitions of the interior and the closure of a hesitant fuzzy soft set will be outlined, accompanied by an analysis of their properties. Finally, the definition of hesitant fuzzy soft continuous mapping will be provided, and the mapping will be characterized. The definition of hesitant fuzzy soft open or closed mappings will facilitate the identification of the necessary and sufficient conditions for a mapping to be hesitant fuzzy soft open (closed).

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On Bipolar Fuzzy Soft Clusters

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Article Info

Oral Presentation

Keywords

Bipolar Fuzzy Soft Set
BFS-cluster
BFS-filter
BFS-topology
BFS-proximity

Abstract

In this paper, we introduce the concept of a bipolar fuzzy soft cluster and derive its key results. We explore the structural properties of this concept and investigate its connections with ultra-bipolar fuzzy soft filters and bipolar fuzzy soft proximity spaces. Through these analyses, we highlight the importance of BFSC in advancing the exploration of proximity-based systems within the bipolar fuzzy soft framework.

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Characteristics of Residual Neural Networks in Approximating Fractional Differential Equations

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Article Info

Oral Presentation

Keywords

Approximate Solutions
Fractional Integral and Differential Equations
ResNets
Variational Iteration Approach

Abstract

This pioneering research undertakes a comprehensive examination of the feasibility and efficacy of employing residual neural networks in approximating Erdélyi–Kober fractional derivatives. We validate our approach using the variational iteration method to derive exact solutions for differential equations. Our results demonstrate the effectiveness of residual neural networks in estimating these equations, and we provide some examples to illustrate their application in solving fractional differential equations.

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The Importance of Residual Neural Networks Lies in Their Ability to Advance The study of Fractional Differential Equations

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Article Info

Oral Presentation

Keywords

Close Approximation
Fractional Differential Equations
Residual Neural Networks
Variational Iteration Method

Abstract

This study provides the first comprehensive demonstration of how to utilise residual neural networks to estimate a family of generalized Caputo type fractional differential equations and their solutions, and how to limit the quantity of parameters present in these residual neural networks. The basis of our evidence is the variational iteration method. It determines the differential equation's exact solution with the use of the variational iteration method. Then it shows how to estimate these equations using residual neural networks, using the structure produced by the variational iteration method.

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Advanced Euler-Maclaurin-TypeInequalitiesviaTemperedFractionalIntegrals: A Focus on BoundedVariationFunctions

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Article Info

Oral Presentation

Keywords

Convex Functions
Euler-Maclaurin-Type Inequality
Quadrature Formula
Tempered Fractional Integrals

Abstract

This research extends the seminal work of Hezenci and Budak [1] by developing advanced Euler-Maclaurin-type inequalities using tempered fractional integrals. By utilizing a key lemma on tempered fractional integrals, we derive innovative inequalities for functions of bounded variation. These findings not only extend existing inequalities but also provide a more comprehensive framework for tempered fractional calculus. Furthermore, we examine specific cases to highlight the practical applications of these inequalities in numerical analysis and other fields.

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Tempered Fractional Integrals and Their Applications: New Euler-Maclaurin-Type Inequalities for Various Function Classes

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Article Info

Oral Presentation

Keywords

Convex Functions
Euler-Maclaurin-Type Inequality
Quadrature Formula,
Tempered Fractional Integrals

Abstract

In this study, we extend the results of Hezenci and Budak by deriving new Euler-Maclaurin-type inequalities using tempered fractional integrals for various function classes. Leveraging a key lemma for tempered fractional integrals, we establish inequalities for bounded functions and Lipschitzian functions, enhancing the scope of existing results in tempered fractional calculus. These new results generalize and enhance existing inequalities by providing a more comprehensive approach to tempered fractional calculus. Furthermore, several specific cases are examined to highlight the practical applications of these inequalities in numerical analysis and other fields.

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Some Novel Weddle's Formula Type Inequalities for Convex Functions with Their Computational Analysis on Quantum Calculus

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Article Info

Oral Presentation

Keywords

Abstract

In this work, we present some of Weddle's formula-type inequalities within the framework of q-calculus for q-differentiable convex functions. For this, we first establish a q-integral identity for q-differentiable convex functions. Then, with the help of this newly established identity, we prove Weddle's formula-type integral inequalities specifically designed for q-differentiable convex functions. These inequalities are very important in Open-Newton-Cotes formulas because, with their help, we can find error bounds for Weddle's formula in both q and classical calculus. Furthermore, we perform computational analysis on these inequalities for convex functions, providing mathematical examples and graphical representations to validate our results in the context of q-calculus.

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Analysing the Symptoms of the Ongoing Pandemic Caused by the SARS-CoV-2 Virus, Using the Fuzzy Soft-Set Theory

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Article Info

Oral Presentation

Keywords

AlgorithmicDecision-MakingMethod
FuzzySoftMatrix
FuzzySoft Set Theory
InteractionFunction

Abstract

The global dissemination of the novel coronavirus disease (COVID-19) has occurred with remarkable rapidity since its initial emergence in 2019. The disease has been identified as a significant threat to public health, with governments, health institutions, and the general population facing potential challenges as a result. A review of the available literature reveals that the primary symptoms observed in patients with the disease are fever, cough, and shortness of breath. It is also noteworthy that cases without symptoms have been reported. This article puts forth the proposition that all potential symptoms be considered across the globe, with each region evaluated on its own merits. Furthermore, to gain insight into the overall situation, the average situation is taken into account. This is achieved by employing the fuzzy soft matrix, a concept derived from fuzzy soft set theory, to define the interaction function. This is then utilized in conjunction with an algorithmic decision-making method, the latter of which has been developed based on this aforementioned definition.

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Some Properties of Soft A-metric Spaces

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Article Info

Oral Presentation

Keywords

Fixed Points
Fixed Point Theorem
Soft Metric
Soft A-metric

Abstract

The first aim of this article is to examine soft A-metric spaces obtained considering the soft points of soft sets and the concept of A-metric spaces in more detail. Firstly, we introduce the definitions of soft continuity, soft sequential continuity and soft sequential compactness for soft A-metric spaces and examine some important properties for these notions. Finally, we prove some fixed point results for soft mappings on soft complete A-metric spaces.

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Some Identities of the Generalized Fibonacci Hyperbolic Functions

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Article Info

Oral Presentation

Keywords

Fibonacci Sequence
Generalized Fibonacci Sequence
Hyperbolic Functions
Symmetrical Hyperbolic Functions

Abstract

In this paper, inspired by recent developments in the study of Fibonacci hyperbolic functions, we study their generalized forms. We define the generalized Fibonacci sine and cosine hyperbolic functions, then extend them by introducing a continuous parameter and develop the symmetric generalized Fibonacci sine and cosine hyperbolic functions. This work focuses on deriving various properties related to these symmetric hyperbolic functions and highlights their structural properties and symmetries. We also present some graphical results that illustrate the practical significance and applications of these functions to support the theoretical findings. This work not only builds on existing research but also provides new perspectives on the generalization of Fibonacci hyperbolic functions with potential implications for both pure and applied mathematical contexts.

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Sufficiency Calculation of Neutrosophic Fuzzy Sets and Their Usage Areas

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Article Info

Oral Presentation

Keywords

Bipolar Neutrosophic Set
Fuzzy Set
Neutrosophic Fuzzy Set
Sufficiency Amount
Sum Sufficiency Amount

Abstract

First, fuzzy sets and neutrosophic fuzzy sets are explained in this work. After that, a definition of bipolar neutrosophic fuzzy sets is provided, along with an explanation of some examples and theorems. It is highlighted that one approach utilized in decision applications is the usage of neutrosophic fuzzy sets and that their significance in an uncertain environment is discussed. This study defines the sufficiency amount and sum sufficiency amount equations in neutrosophic fuzzy sets and suggests a method to be applied in sensitive data groups.Due to its ease of application, calculations can be easily made on data groups with uncertain approximation. These quantities are helpful in neutrosophic fuzzy sets as decision-making tools. Sensitive data sets are used for sample applications, the outcomes are examined, and it is advised to use them in unclear situations. Additionally, a comparison with other existing methods is made. In the last part, the areas in which the study can be used are mentioned, and analyses are completed, discussed, and concluded with the findings.

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Inverse Coefficient Analysis in Semi-Linear Parabolic Heat Conduction Models

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Article Info

Oral Presentation

Keywords

Fourier Method
Inverse Problem
Periodic Boundary Condition
Quasilinear Pseudo-Parabolic Equation

Abstract

In this study, we examine a coefficient problem for the inverse problem of a quasilinear pseudo-parabolic equation with periodic boundary conditions. By employing an iterative method, we establish the existence, uniqueness, and continuous dependence of the solution on the given data.

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Fractional Newton-Type Inequalities by Using Bounded and Lipschitzian Functions

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Article Info

Oral Presentation

Keywords

Bounded Functions
Lipschitzian Functions
Newton-type Inequalities
Quadrature Formulae

Abstract

In the present article, we establish some Newton-type inequalities for bounded functions by Riemann-Liouville fractional integrals. In addition, we construct some Riemann-Liouville fractional Newton-type inequalities for Lipschitzian functions.

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Fractional Newton-Type Inequalities for Twice Differentiable Convex Functions Using Riemann-Liouville Integrals

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Article Info

Oral Presentation

Keywords

ConvexFunctions
Newton-typeInequalities
Riemann-LiouvilleFractionalIntegrals
TwiceDifferentiableFunctions

Abstract

In this study, Newton-type inequalities for twice differentiable convex functions, including Riemann-Liouville fractional integrals are established. Firstly, an identity involving Riemann-Liouville fractional integral is derived, which is then used to obtain new Newton-type inequalities. These inequalities are derived by utilizing the convexity of twice differentiable functions, Hölder's inequality, and the power mean inequality. The results are further illustrated through special cases of the derived theorems.

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Analytical and Computational Solutions for Nonlinear Hyperbolic Equations with Inverse Coefficient under Periodic Boundary Conditions

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Article Info

Oral Presentation

Keywords

FiniteDifferenceMethod
FourierMethod
InverseCoefficient Problem
NonlinearHyperbolicEquation
Non-localBoundaryCondition
OverdeterminationCondition

Abstract

This study investigates an inverse problem of unknown time-dependent coefficients in the one-dimensional nonlinear hyperbolic equation with periodic boundary conditions. The generalized Fourier method is employed to construct the Fourier coefficient for the solutions, and using iteration method convergence, the uniqueness and stability of the solution to the nonlinear problem are proved. Additionally, in order to solve the inverse problem numerically Finite Difference Method (FDM) with Gauss-Seidel Iteration process is proposed. Two different implicit finite difference schemes are applied, namely, implicit and Crank-Nicolson. A numerical example is presented to illustrate the method's behavior. Both numerical predictions are close to experimental results, however, the estimation of the implicit scheme has a lower true error and relative true error than the Crank-Nicolson scheme.

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Analysis of Inverse Coefficient Nonlinear Pseudo-Hyperbolic Equation with Periodic Boundary Condition

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Article Info

Oral Presentation

Keywords

Finite Difference Method
Fourier Method
Inverse Coefficient Problem
Nonlinear Pseudo-Hyperbolic Equation
Non-local Boundary Condition

Abstract

This research delves into an inverse problem concerning time-dependent coefficients in a one-dimensional nonlinear pseudo-hyperbolic equation subject to periodic boundary conditions. Employing the generalized Fourier method, we construct Fourier coefficients for the solutions. Through iterative convergence analysis, we establish the uniqueness and stability of solutions to the nonlinear problem. Furthermore, to tackle the inverse problem numerically, we propose employing the implicit Finite Difference Method (FDM). Two finite difference equations are formulated and solved with different accuracies. In the first equation, a first-order accurate time discretization is used, and second-order accurate finite difference equations are employed for spatial and multi-variable partial differential equation discretization. In the second equation, a second-order accurate time discretization is applied, and fourth-order accurate finite difference equations are utilized for the discretization of spatial and multi-variable partial differential equations. At a specific time, the u value appears as a hyperbolic curve with one negative peak and one positive peak. However, in terms of the estimated u value, the difference between two different accurate schemes is minimal, and these values align with the real values. Additionally, the finite-difference scheme with higher accuracy provides a better estimation of the inverse coefficient.

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Weighted Generalizations of Some Fractional Integral Inequalities

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Article Info

Oral Presentation

Keywords

Bounded Function
Fractional Integrals
Integral Inequalities
Lipschitzian Function
Weight Function

Abstract

In this study, first, we will present an identity for differentiable functions involving a weight function. Then by using this equality, we obtain some weighted inequalities for Riemann-Liouville fractional integrals. For this aim, we will use some functional classes such as bounded functions, Lipschitzian functions, etc. We also present several remarks and corollaries by the special choice of weight function.

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Lacunary Statistical Convergence of Soft Point Sequences

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Article Info

Oral Presentation

Keywords

Lacunary Statistical Convergence
Soft Point
Soft Set

Abstract

Convergence, defined based on its mathematical structure, varies accordingly and can be compared across different types. Statistical convergence, initially defined in real numbers using natural density, generalizes topological convergence. Recently, this convergence type has been extensively studied, leading to numerous variants. Another key concept in our study is soft sets, which address uncertainties in applied fields where classical sets are inadequate. While some results exist on the topological convergence of soft point sequences in soft topological space, no studies have addressed lacunary statistical convergence. This study defines the lacunary statistical convergence of soft point sequences in soft topological space and presents its general properties. Instead of the commonly used natural (asymptotic) density function, an unbounded modulus function and a density function defined by a real number are employed. Additionally, we obtain inclusion results comparing all lacunary convergent sequence sets, which vary with parameters such as the real number, lacunary sequence, and modulus function used in our study.

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Spectrum Density Estimation of Sample Covariance Matrices with Correlated Entries

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Article Info

Oral Presentation

Keywords

Marchenko-Pastur Distribution
Stieltjes Transform
Weak Dependence

Abstract

We focus on kernel estimator of the density function of the limiting spectral distribution of sample covariance matrix\ associated firstly, to a large class of weak dependent sequences of real-valued random variables having only moment of order 2. Afterwards, sample covariance matrices of the block-independent model and the random tensor model, where the data does not have independent coordinates. In the last two cases, we show that the kernel estimator of the density function converges to the Marchenko-Pastur density with probability one. A simulation study is conducted to show the performance of the kernel estimators of the density function and then compare these estimators with the one obtained by the Stieltjes transform method.

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A Green Solid Capacitated Transportation System in the Decomposed Pythagorean Fuzzy Configuration

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Article Info

Oral Presentation

Keywords

Capacitated Solid Transportation System
Decomposed Fuzzy Set
Decomposed Pythagorean Fuzzy Set
Score Index
Sustainable Transportation

Abstract

Recently introduced decomposed Pythagorean fuzzy set (DPyFS) is an amalgamation of decomposed fuzzy sets and Pythagorean fuzzy sets, that investigate how each element in a set demonstrates membership and non-membership from both an optimistic and pessimistic perspective. This article first introduces a score index for the ranking of DPyFS. Thereafter, a sustainable capacitated solid transport framework under the DPyFS configuration is formulated. The proposed transportation system aims to optimize overall transportation expenses and the emission of greenhouse gases. In order to deal with the proposed capacitated transportation problem, Intuitionistic fuzzy programming and a devised score index are employed. A numerical computation is also carried out to elaborate on the efficiency of the proposed model in real-world transportation systems.

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Numerical Solutions of Higher-Order Differential Equations by the Laguerre Collection Method

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Article Info

Oral Presentation

Keywords

Collection Points
Laguerre Collection Method
Laguerre Polynomials
Numerical Solutions

Abstract

Numerical solutions are approximate solutions to higher-order differential equations. These solutions are frequently employed in situations where analytical answers are difficult or impossible to find. Numerical methods for differential equations refer to techniques for obtaining numerical approximations to differential equations (DEs). This paper presents a numerical approach for obtaining an approximate solution to higher-order differential equations. The Laguerre Collection approach has been proposed for several types of differential equations. The Laguerre Polynomial was used to demonstrate the Laguerre collocation method for solving higher-order differential equations. The Laguerre collection method works by computing the coefficients in the Laguerre expansion of a high-order differential equation solution. The proposed method may convert many sorts of problems into algebraic equations by using truncated Laguerre series solutions, matrix operations, and collection points. The unknown Laguerre coefficients were calculated by solving the system of equations. Changes have been made for each form of differential equation. Numerical experiments were used to assess the method's accuracy and efficiency. The efficacy of this method was compared to the Bessel Collection Method. The results of Numerical Illustrations were calculated using the MATLAB R2020b computer software.

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Ruxolitinib Inhibits Colony Formation in Tamoxifen-Resistant BT474 Breast Cancer Cell Line

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Article Info

Oral Presentation

Keywords

Drug Resistance
ER+ Breast Cancer
Ruxolitinib
Tamoxifen

Abstract

Breast cancer (BC) is the leading cause of cancer-related deaths in women worldwide. Tamoxifen, a nonsteroidal anti-estrogen, is the most commonly used therapeutic agent in patientswith ER-positive breast cancer. However, the mechanisms underlying the development of resistance to Tamoxifen remain poorly understood. This study aims to investigate the effects of the JAK inhibitor Ruxolitinib on colony formation in Tamoxifen-resistant BT474 cells.

Cells were cultured. Drug doses were determined by MTT assay. A colony formation assay was performed on the metastatic effect of ruxolitinib on cells.

The IC50 values of ruxolitinib on Tamoxifen-resistant BT474 cellswere 50 μM. Cellswere not sensitive to ruxolitinib treatment for 24 hours, and exposure to ruxolitinib for 72 hours resulted in celltoxicity. Accordingly, the experimental protocol was modified to include a 48-hour incubat ion with ruxolitinib. There were no alterations in colonyformation in either the untreated control group orthe group treatedwith DMSO. Ruxolitinib treatment significantly inhibited colony formation in cells.

The results of this study demonstrate that ruxolitinib significantly suppresses colony formation in cells. Targeting colony formation in tamoxifen-resistant ER+ breast cancer cells presents a promising therapeutic strategy to impede disease progression, mitigate metastatic potential, and enhance overall patient survival.

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Comparative RNA-Expression Meta-Analysis of Antennae and Leg Appendages in Insects and the Impact of Distal-Less (Dll) Gene Knockdown on Appendages in (Broad-Horned Flour Beetle) GnathocerusCornutus

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Article Info

Oral Presentation

Keywords

Appendage Development
Exaggerated Mandibles
Evolutionary Biology
Sexual Dimorphism

Abstract

Phenotypic variations are often caused by changes in gene expression, while the developmental programs and signaling pathways remain well-preserved. This research emphasizes the concept of homologous structures. The study employs meta-analysis of transcriptome data and gene knockdown experiments to elucidate the genetic basis of appendage differentiation and specialization. The investigation develops into the differential gene expression and co-expression study of antennae and legs in three insect species, Tribolium castaneum, Heliconius Melpomene, and Danaus plexipus. A total of 371 genes were differentially expressed between antennae vs leg tissues across three species and a total of 278 differentially expressed genes were identified in between leg tissue comparisons in three species. Co-Expression revealed associated network and hub genes for differentiation of leg and antennae. Gene Ontology (GO) analysis categorized the DEGs into biological processes, molecular function, and cellular components revealing antennae-specific heat sensing pathways and leg-specific muscular regulatory pathways. The KEGG pathway categorized oxidative phosphorylation as the most prominent pathway in leg tissue expression. Additionally, the study explored the functional significance of the highly conserved distal-less (dll) gene in appendage development in (broad-horned flour beetle) Gnathocerus cornutus. Leg structures were significantly reduced in the knockdown experiment. Overall, the findings have broader implications for understanding of regulatory network of appendage development and fields such as evolutionary biology and insect pest management.

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Effects of Gibberellic Acid and Kinetin Treatments on In vitro Seedling Development, Total Phenolic Substance, and Flavonoid Contents in Arugula

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Article Info

Oral Presentration

Keywords

Eruca vesicaria
phenolic compounds
plant growth regulators
plant tissue culture

Abstract

The concentration-dependent effects of gibberellic acid (GA_3) and kinetin (KIN) on *in vitro* seed germination, organ development, and phenolic substance contents in arugula (*Eruca vesicaria* subsp. *sativa*) were investigated. The seed germination ratio and leaf production increased to 100% and 3.93 leaves, respectively, after GA_3 treatment at 0.25 mg L^{-1}. GA_3 at 0.25 mg L^{-1} treatment also resulted in more elongated roots (4.03 cm) than the other treatments. However, the stimulative effect of GA_3 on root elongation was not recorded in root production. The highest root number (1.93 roots) was recorded from the control seedlings, and KIN treatments resulted in a concentration-dependent decrease in the parameter. Hypocotyl elongation was triggered after 0.25 mg L^{-1} GA_3 treatment. Total phenolic substance (TPC) and flavonoid content (TFC) were estimated from methanolic extracts obtained through ultrasonic extraction and expressed as gallic acid (GA) and quercetin (Q) equivalents (E), respectively. A slight increase in the TPC to 11.57 mg GAE g^{-1} DW was found after KIN treatment at 0.25 mg L^{-1} compared to the control (10.35 mg GAE g^{-1} DW). A similar trend was also recorded in TFCs. KIN treatments at 0.25 and 1.0 mg L^{-1} increased the content (7.42 and 7.40 mg QE g^{-1} DW, respectively) compared to the control (6.43 mg QE g^{-1} DW). The results suggested that GA_3 and KIN treatments at 0.25 mg L^{-1} can enhance arugula's growth parameters and phenolic substance content, respectively.

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Bivariate Generalization of Durrmeyer Operators Based on Beta Function

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Article Info

Oral Presentation

Keywords

Bögel Space
Durrmeyer Operator
Global Approximation
Lipschitz-Maximal
Peeter's K-functional

Abstract

In this study, we construct a new sequence of bivariate Summation-integral type hybrid operators and their approximation behavior. Moreover, the rate of convergence of these operators is given by using the modulus of continuity. Further, Lipschitz-maximal, Peetre's K-functional, and global approximation results are investigated using weight functions. Furthermore, approximation behavior in Bögel functional space is studied. Lastly, the Summation-integral type hybrid operators for the function of two variables are used to validate the numerical results and obtain the graphical illustration of the convergence behavior of the operators univariate and bivariate cases separately.

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Novel Fractional IntegralI nequalities of Bullen-Mercer Type Pertaining to Differentiable Convex Functions with Applications

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Article Info

Oral Presentation

Keywords

Bullen-Mercerinequality
Convex Function
Hölder's Inequality
Lipschitz Function
Numerical Analysis
Young's Inequality

Abstract

In this paper, we derive a new Bullen-Mercer type fractional integral identity for differentiable function. By using this identity and many well-known inequalities as auxiliary tools, some novel Bullen-Mercer type inequalities for differentiable convex functions are obtained. Furthermore, from our main results we discuss several important special cases. Moreover, we offer Bullen-Mercer type inequalities pertaining to Lipschitz and bounded functions. Finally, applications to the error bounds, q-digamma function and modified Bessel function are given.

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Error Boundaries of Newton-Cotes Schemes Based on m-Convex Functions

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Article Info

Oral Presentation

Keywords

Bounded Function
Convex Functions
Error Inequalities
Newton-Cotes
Simpson's Inequality

Abstract

This study is intended to explore some novel error boundaries of Newton-Cotes schemes pertaining to m-convex functions. In this regard, first, we construct a generic identitiy based on several parametrs. By making use of this auxiliary results, fundamental results of inequalities and m-convexity, we create several generic integral inequalities. Also, we present some interesting consequences of primary findings and applications to justify the significance of findings.

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Behavior of Deformable Elliptical Plates with Micropolar Fluids

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Article Info

Oral Presentation

Keywords

Deformable Transverse Roughness
Elliptical Plates
Micropolar Fluid
Reynolds' Equation
Squeeze Film

Abstract

The present analysis theoretically examines the effect of surface roughness on squeeze film elliptical plates lubricated with a micropolar fluid. Utilizing Christensen's stochastic model, a stochastic Reynolds-type equation is derived. Closed-form solutions for squeeze film pressure, load carrying capacity, and squeeze film time are obtained. This analysis highlights how roughness impacts the characteristics of the film squeezed between rough elliptical plates with micropolar fluid lubrication. The results indicate that increasing the roughness parameter, coupling number, and couple stress parameter leads to higher pressure, increased load-carrying capacity, and longer squeeze film time.

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Comparative Analysis of BB84 and E91 Quantum Cryptography Protocols

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Article Info

Oral Presentation

Keywords

Bell's Inequality
BB84 Protocol
E91 Protocol
Entanglement
Quantum Cryptography
Quantum Key Distribution
Protocols

Abstract

In this study, the BB84 and E91 quantum cryptography protocols are comparatively analyzed. The BB84 protocol, based on the fundamental principles of quantum mechanics, enables secure key exchange and is more widely used in practice due to its simpler implementation requirements. The E91 protocol, on the other hand, theoretically provides superior security by employing the violation of Bell's inequality and entanglement, but it faces practical challenges, such as maintaining entangled states over long distances. The paper presents a mathematical analysis of both protocols, comparing factors such as error rates, key generation rates, and security conditions. In conclusion, it is noted that while BB84 is more feasible in practical applications, E91 provides stronger theoretical security.

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Development of Fractional Ostrowski-Mercer Type Inequalities Involving s-Convex Function

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Article Info

Oral Presentation

Keywords

Applications
Bounded Function
Fractional Operators
Integral Inequalities
Ostrowski Inequality

Abstract

This study aims to establish new generalized versions of Ostrowski's like inequalities associated with unified fractional operators, and Brecner convexity in the second sense. To accomplish this task, we derive a new fractional identity. Deploying this fractional auxiliary result and Mercer inequality for s-convexity, we construct new bounds of Ostrowki's like inequalities. Furthermore, we present some potential consequences and applications of the proposed results.

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Reliability Estimation of Five Reboot Delay Configurations with Warm and Cold Standby Units

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Article Info

Oral Presentation

Keywords

Configurations
Data Center
MTTF
Reboot Delay
Reliability

Abstract

In this present study, the estimation of reliability for a data center requiring 1000 kilowatts (kW) with a rebooting system was analyzed. Ensuring a 100 percent uptime is a top priority for every data center and most have an established architecture in place to reduce the risk of downtime. For this study, five different series-parallel configurations with both warm and cold standby are considered. Configuration 1 comprises of three units, one primary 1000kW unit attached with warm and cold standby units, configuration 2 includes two primary 500kW units with two warm and one cold standby units, configuration 3 has four primary 250kW units with one warm and two cold standby units, configuration 4 consists of five 200kW units with two warm and one cold standby units. Lastly, configuration 5 encompasses ten primary 100kW units with both cold and warm standby units. It is assumed that failure and repair rates follow an exponential distribution. Through the transition diagram of each configuration, system of first order differential-difference equations developed to obtain the expressions for system availability and mean time to failure. Numerical experiment are performed to capture the impact of system parameters on system availability, mean time to failure and cost benefit analysis. The configurations are ranked based on the system parameters to determine the optimal configuration. A comprehensive analysis of the correlation coefficients between the availability and mean time to failure of the configurations and parameters is performed to see the most crucial parameter. This study is crucial for system engineers, plant management, and maintenance personnel to design and analyze suitable maintenance policies and processes. It also helps in evaluating the performance and safety of the system during and after the burn-in period.

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Mathematical Modelling of Bio-Convective Casson Nanofluid Flow over a Curved Stretching Surface Subject to Thermal Radiation and Chemical Reaction

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Article Info

Oral Presentation

Keywords

Bioconvection
BVP4C
Casson Nanofluid
Chemical Reaction
Curved Stretching Surface
MATLAB
Thermal Radiation

Abstract

This study explored the variations noted in Casson nanofluid under the influence of thermal radiation, activation energy, magnetic effect, and chemical reaction. Model characterized as the flow of nanofluid through the curved stretchable medium under the above-imposed conditions. Motile microorganisms are added for the sake of getting the best rate of heat and mass transport. Due to the addition of these microorganisms, the process of bioconvection occurred for the mode of transfer of heat and mass. Further, Brownian motion, chemical process, and thermophoresis impacts are scrutinized from the heat and mass transport properties. Under discussion, the model is governed by PDE`s system, and by the smooth utilization of similarity transform this system transformed to the ODE`s system. For numerical results, the resultant governing equations are treated by the `bvp4c` built-in package of MATLAB with a shooting approach. Graphical representations depict the influence of dimensionless quantities occurred when differential systemsare made dimensionless. Reported results corroborated during the literature review and good assimilation was received. The impacts of Sherwood number, Skin quantity, microorganism density, and local Nusselt quantity on concentration, temperature, velocity, and microorganism profiles are also visualized and discussed. The Peclet number and bioconvection parameter decrease the heat transport rate. Sherwood number increases significantly with the increase of Brownian motion and Schmidt number. In the field of engineering, mechanical energy, and power generation are developed by the process of bioconvection in nanofluid. During this mechanism, bioconvection combination with motile microorganisms supplemented the rate of heat and mass transport.

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A New Approachforthe Solution of Space Fractional Navier-Stokes Equations by the Homotopy Analysis Method and Residual Power Series Method

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Article Info

Oral Presentation

Keywords

Caputo Derivative
Homotopy Analysis Method
Navier-Stokes Equations
Residual Power Series Method

Abstract

The motivation of this study is to construct the solution of space fractional Navier-Stokes equations by the Homotopy Analysis Method (HAM) and Residual Power Series Method (RPSM). The approximation solution of this equation is calculated in the form of a series which its components are computed easily. Illustrative examples are presented to exhibit a comparison between the HAM and the RPSM.

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Analyzing Animal Behavior through Functional Equations: Mathematical Modeling and Machine Learning Approaches

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Article Info

Oral Presentation

Keywords

Fixed-Point Theory
Functional Equations
Machine Learning
Modelling

Abstract

In this study, we aim to explore various models from psychological and learning theories and to formulate a general functional equation applicable to these models. Utilizing tools from fixed point theory, we derive results concerning the existence, uniqueness, and stability of solutions for the proposed functional equation. To highlight our main findings, we present two illustrative examples.

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Error Bounds of Boole's Formula for Twice Differentiable Convex Functions with Their Computational Analysis

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Article Info

Oral Presentation

Keywords

Abstract

In this study, new Boole's identity foe twice differentiable functions is proved. By using the newly established identity, Boole's type inequalities for second-times differentiable convex functions are proved. Numerical examples are given to check the validity of newly established results. In the future, these results can be extended by using different convexities and other forms of calculus.

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Mathematical Modeling of Polio Transmission and Hospitalization with the Effects of Vaccination Using a Modified ABC Fractional Operator and Artificial Neural Networks

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Article Info

Oral Presentation

Keywords

Laplace Adomian Decomposition Technique
Modified AtanganaBaleanu Derivative
Polio Model
Qualitative Analysis

Abstract

In order to investigate the dynamics of polio infection transmission, this work proposes a deterministic mathematical model that takes hospitalization and vaccination into consideration. There are six groups within the population of polio victims. A fractional derivative model known as the modified Atangana-Baleanu-Caputo (mABC) exists to represent the dynamics of polio spreading after immunization. The study applies the Adomian polynomial and decomposition technique to construct a series-type solution and explores whether there are any non-zero solutions to the problem under the modified operator.

Fixed point theory is used to make a qualitative study of the model's solution, and the Picard method is used to verify the solution's stability. For the proposed model, numerical results and simulations under different fractional orders and transmission parameters are described. The positivity and numerical stability of the solutions provide data for the analysis that the mABC operator can be applied in fractional calculus and other physical disciplines. Using Artificial Neural Network (ANN) approaches, the dataset is split into training, testing, and validation sets. A detailed analysis is conducted for each category.

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Electronic and Optical Properties of Weyl Semimetals

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Article Info

Oral Presentation

Keywords

Topological Materials
Weyl Semimetals
Weyl Fermions

Abstract

Weyl semimetals are an important class of materials characterized by the presence of massless Weyl fermions, which exhibit distinct topological properties. Understanding how these materials interact with electromagnetic waves is crucial for revealing their potential applications. In this study, considering TM (Transverse Magnetic) mode solutions of Maxwell's Equations for Weyl semimetals, optical and electronic properties arising from their interactions with electromagnetic waves are thoroughly examined.

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Analysis with Box-Behnken Design for Methyl Blue Dye Removal by Inorganic-Organic Hybrid Containing Tyrosine

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Article Info

Oral Presentation

Keywords

Adsorption
Anova
GPTS
Methylene Blue
Removal
Tyrosine

Abstract

Dyes are widely used in many industries such as textiles, cosmetics, pharmaceuticals, food, paper and plastics. Many dyes have molecules that are not biodegradable and do not react easily with chemicals, and because of these properties, efforts to reduce their environmental hazards must be more diligent than for any other organic compound. Removal of dyes from aqueous environments is of great importance in order to prevent pollution and damage caused by dyes in the structure of water resources. Many methods such as precipitation, solvent extraction, membrane filtration, coagulation, flocculation, electroflotation, biodegradation and adsorption are used to remove dyes from aqueous media. Among these, adsorption stands out as the most widely applied method due to its easy execution, high efficiency and simple recovery.

This study examined the efficacy of removing methyl blue from aqueous solutions inorganic-organic hybrid containing tyrosine as an adsorbent. The characterization of the synthesized adsorbent was evaluated by FT-IR analysis. Employing a batch system, the influence of pH, initial dye concentration, and amount of adsorbent on the adsorption of methyl blue was examined via Response Surface Methodology (RSM) predicated on Box-Behnken design (BBD) modeling. The BBD modeling technique was employed to discern optimal process conditions of variables that yield the most favorable responses. The identification of optimal adsorption conditions hinged on the maximization of pivotal operational parameters. ANOVA analysis was conducted to ascertain the degree of parameter effectiveness. This study underscores the prominence of inorganic-organic hybrid containing tyrosine as an economical and potent adsorbent in the context of methyl blue removal.

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Investigation of Medical Cu Isotope Production in Accelerators

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Article Info

Oral Presentation

Keywords

Charged Particle Accelerator Medical
Copper-64
Copper-67
Cross Sections
Radioisotopes

Abstract

Medical radioactive copper isotopes represent a significant advancement in the diagnosis and treatment of cancer, as well as in neurological studies and other medical applications. They facilitate the early detection of diseases, thereby enabling the implementation of more efficacious treatment modalities. The ^{64}Cu and ^{67}Cu isotopes are frequently employed in this context. The medical applications of ^{64}Cu are numerous, including cancer diagnosis, tumour tracking and monitoring of other biological events, examination of neurons and investigation of neurological diseases. It is also used for radiolabelling of biomolecules. ^{67}Cu is employed in targeted radionuclide therapy due to its suitability as an isotope for radiation therapy. This study will investigate the production of medical copper using low-energy accelerators.

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Carbon Dioxide Sequestration into Calcium Carbonate Using a Novel Carbonic Anhydrase from Camel (Camelus Dromedarius)

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Article Info

Oral Presentation

Keywords

Camel
Camelus Dromedarius
Carbon Dioxide Sequestration
Carbonic Anhydrase

Abstract

Carbonic anhydrase (CA) is ubiquitous enzyme that plays an important role in life by catalyzing the reversible hydration/dehydration of carbon dioxide (CO_2) and water (H_2O) into bicarbonate ion (HCO_3^-) and proton (H^+). Biotechnologically, CA could be used for sequestration of CO_2 into value-added products. In this context, for the first time, we purified and characterized a novel CA from liver of camel (*Camelus dromedarius*), an animal that survive extreme desert conditions. The purified enzyme was successfully and efficiently used for sequestration of CO_2 into calcium carbonate ($CaCO_3$). Characterization studies revealed that the camel liver CA was a monomer with lower molecular weight (25 kDa) and exhibited a higher optimum pH (pH 9.0) and temperature (45°C). In addition, the enzyme remained active and stable at strongly alkaline pH (pH 9.0) and higher temperature (60°C). The enzyme contained Fe as a physiologically-relevant cofactor instead of Zn. The enzyme was inhibited by metal ions ($Cu^{2+} > Zn^{2+} > Fe^{3+} > Cr^{3+} > Ni^{2+} > Cd^{2+} > Co^{2+} > Al^{3+} > Mg^{2+} > Ca^{2+}$), whereas it required high concentrations of Ca^{2+} to achieve inhibition. These biochemical properties suggest that camel liver CA has strong potential for applications in sequestering of CO_2 into $CaCO_3$. In fact, in presence of 1, 2, 5, 10 and 20% Ca^{2+}, this enzyme showed higher capacity in this process with a value of 966.67 mg $CaCO_3$/mg enzyme in presence of high concentration of Ca^{2+} (up to 20%). Camel CA is a promising candidate for CO_2 sequestration under harsh industrial conditions.

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The Effect of Dielectric Constant on Power Conversion Efficiency in P3HT-Based Organic and Hybrid Solar Cells

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Article Info

Oral Presentation

Keywords

DielectricConstant
Hybrid Solar Cells
Organic Solar Cells
Power ConversionEfficiency
P3HT

Abstract

The primary aim of this study is to experimentally investigate the relationship between the dielectric constant of the active layer and the power conversion efficiency in P3HT-based organic and hybrid solar cells. I-V measurements were conducted for each solar cell produced using different mass ratios of P3HT and PCBM, with the highest power conversion efficiency calculated as 1.68%. The dielectric characterization of the solar cells was performed through capacitance measurements of the active layers, and the impact of the obtained dielectric constants on power conversion efficiency was analyzed. It was observed that charge separation is limited in organic solar cells due to their low dielectric constants, while cells with higher dielectric constants yielded higher efficiencies. The results demonstrate that as the dielectric constant of the active layer increases, so does the efficiency of the solar cells. These findings provide valuable insights for enhancing the efficiency of organic and hybrid solar cells.

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Equation Containing Fractional Derivative and Periodic Boundary Conditions

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Article Info

Oral Presentation

Keywords

Fourier Method
Periodic Boundary Conditions
Time Fractional Diffusion

Abstract

This paper is about the identification of the fractional diffusion problem with periodic boundary conditions. The existence, uniqueness as well as continuous dependence on data for the problem is presented with certain regularity and consistency conditions. The generalized Fourier method is utilized in this study. The algorithm of the method and an example are also presented to show the effectiveness and accuracy of the proposed method.

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Study of the Cross Section of the $^{133}Cs(p,3n)^{131}Ba$ Reaction for the Production of the Medical Isotope ^{131}Ba

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Article Info

Oral Presentation

Keywords

Barium-131
Charged Particle Accelerator
Cross Sections
MedicalRadioisotopes

Abstract

Radioisotopes play an important role in many nuclear medicine applications such as cancer diagnosis, research, monitoring, and treatment of other biological phenomena. Barium-131 has a suitable half-life of 11.5 days for medical use and is a radioisotope compatible with Single Photon Emission Computed Tomography (SPECT) for nuclear medicine. Due to the similar chemistry and pharmacological properties of the elements barium and radium, barium-131 can be used diagnostically with the therapeutic alpha emitters radium-223 and radium-224. It is therefore expected that the radioisotope barium-131 will be used in the future as part of current approaches to the treatment of bone cancer and bone metastases. The cross sections of the $^{133}Cs(p,3n)^{131}Ba$ reaction producing barium-131 are calculated for different nuclear parameters and compared with available experimental results. In addition, the production of medical barium-131 isotopes has been simulated for different accelerator and target parameters.

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POSTER PRESENTATIONS

Study on Determining and Improving the Changes in Physical, Chemical and Mechanical Properties of Thermoplastic Materials After Recycling in the Automotive Industry

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Article Info

Poster Presentation

Keywords

Automotive
Injection Molding
Polypropylene
Recycling
Thermoplastic

Abstract

Thermoplastic materials are widely used in the automotive industry due to their light weight, durability, recyclability, versatility in shaping. Thermoplastic materials are employed in various applications in the automotive industry, including interior and exterior parts, vehicle body components and insulation. Recycling thermoplastic polymer materials used in the automotive industry reduces waste and minimizes negative environmental impacts. The aim of this study is to facilitate the recycling of thermoplastic materials used in the automotive industry.

Recycled materials, such as sprues and defective parts are generated after the injection process of thermoplastic polymer materials used in the automotive industry. In this study; physical, chemical, and mechanical tests will be applied to the recycled parts obtained by crushing and reusing these materials to determine the physical, chemical, and mechanical changes in the thermoplastic material. The recycled thermoplastic products obtained from the crushing unit after the injection process will be subjected to the injection process again and the resulting products will be tested for physical, chemical, and mechanical properties. This represents the result of the initial crushing. The same procedures will be applied to each thermoplastic material, including the initial injection, first crushing, first injection, second crushing, second injection, third crushing, third injection, fourth crushing and fourth injection process steps, followed by product testing. Subsequently, the test results of the products obtained after the injection process will be compared with the original raw material TDS (Technical Data Sheet) test results to determine the physical, chemical, and mechanical changes based on the raw material. In the later stages of the study, injection molding process trials will be conducted with PA, ABS, PC, PC-ABS, and PE raw materials.

The study will include tests such as Density, Melt Flow Rate, Tensile Modulus, Tensile Stress, Flexural Modulus (InjectionMolded), Charpy Notched Impact Strength, Notched Izod Impact Strength, Shore Hardness, Heat Deflection Temperature, Vicat Softening Temperature and UV testing. In the later stages of the study, more specific tests, including Thermogravimetric Analysis (TGA), Differential Scanning Calorimetry (DSC), Heat Aging, FTIR, SEM, and TEM analysis will be performed to investigate structural changes in thermoplastic materials that have been recycled multiple times.

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Investigation of the Cytotoxic Effect of Spirotetramat on BEAS-2B Cells

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Abstract

Spirotetramat, a systemic insecticide derived from tetramicacid and belonging to the cyclick etoenol class of new pesticide categories, acts by inhibiting the enzyme Acetyl-Co Acarboxylase (ACC), thereby disrupting lipid biosynthesis. In recent years, it has been widely and effectively used, particularly in the control of sucking insects and mite species. However, various studies have reported that spirotetramat may also cause toxic effects on non-targetorganisms. This study aimed to investigate the cytotoxic effect of spirotetramat on BEAS-2B healthy human bronchial epithelial cells using the XTT assay. BEAS-2B cells were seeded at 5000 cells/well in 96-well microplates and exposed to different concentrations of spirotetramat (12.5, 25, 50, 100, 150, 200, 300, 400, and 500 µg/ml) for 24 hours. At the end of the exposure period, a percentage cell viability graph was prepared using the XTT kit (Biological Ind.), and the IC50 value was calculated. The experiments were performed in triplicate. Our results indicated that spirotetramat exerts a cytotoxic effect on BEAS-2B cells, with an IC50 value of 70.72 µg/ml for a 24-hour period. Based on these preliminary data, further stages of our research will focus on determining the cell death mechanism induced by spirotetramat and investigating its genotoxic potential.

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Migration-Based Static Charge Control in Polypropylene with Bio-Based Antistatic Additives

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Abstract

Polypropylene (PP), despite having a wide range of industrial applications, is prone to static charge accumulation due to its low electrical conductivity. This situation may pose safety risks in sectors such as electronics, automotive, and packaging, as well as adversely affect product performance. In this study, antistatic additives that are effective with migration mechanisms were used in order to improve the antistatic properties of polypropylene. The antistatic additives used have a migration mechanism and aim to move to the polymer surface and distribute the static charge. In addition, in this context, different ester-structured antistatic additives were synthesized and the performances and usage amounts of these additives in polypropylene were compared. Surface resistance tests, antistatic performance evaluations, and mechanical property analyses were performed to examine the effectiveness of the additives in the polypropylene matrix. The results obtained show the suitability of these additives especially for applications requiring short-term antistatic protection and reveal the performance changes according to usage amounts and additive types.

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