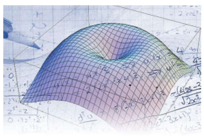

ABSTRACT BOOK

FOURTH WESTERN BALKAN CONFERENCE ON MATHEMATICS AND APPLICATIONS

September 6-7, 2024, Tirana, Albania

(http://wbcma2024.ilirias.com)

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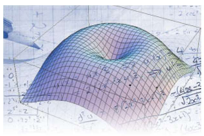

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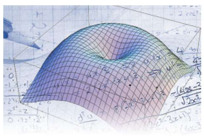
FOREWORD

On behalf of the Organizing Committee, we are very pleased to welcome you to the fourth Western Balkan Conference on Mathematics and Applications, September 6-7, 2024 (**http://wbcma2024.ilirias.com**), in face to face and online form, supported by Ilirias Research Institute(www.ilirias.com), Polytechnic University of Tirana, Albania: https://upt.edu.al/ and University of Prishtina (www.uni-pr.edu), Prishtina, Kosovo. We hope that, fwbcma2024 will be one of the most beneficial scientific events, bringing together mathematicians from all over the world, and demonstrating the vital role that mathematics play in any field of science and its application.

Naim L. Braha

On behalf of the organizing committee



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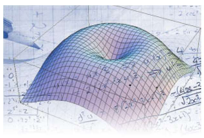

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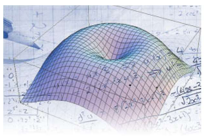

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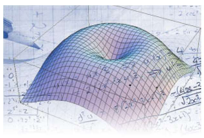

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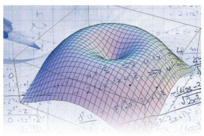

- Adrian Naço, Polytechnic University of Tirana, Albania
- Sandër Kovaçi, Polytechnic University of Tirana, Albania
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Eberhard Malkowsky
Department of Mathematics University of Giessen, Germany

Mikail Et
Department of Mathematics, Firat University, Turkiye

David Kalaj
Department of Mathematics, University of Podgorica, Montenegro

Tibor Pogany
Institute of Applied Mathematics, John von Neumann Faculty of Informatics, Obuda University, Budapest, Hungary and Faculty of Maritime Studies, University of Rijeka, Croatia

Ekrem Savas
Department of Mathematics, Usak University, Usak/ Turkiye

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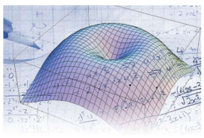

Stability of Global Solution of Wave Equation With Nonlinear First Order Perturbation Terms

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Abstract: In this work, we study the wave equation with damping, source and nonlinear first order perturbation terms. Our aim is to prove that if the damping terms dominated the first order perturbation term then the energy is decreasing After that, we use some assumptions for initial data to prove that the solution of this system is global.

Keywords: Wave equation ; Damping term ; Source term ; First order perturbation term ; Global existence.

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On the Concept of Rough Cesaro-Euler Statistical Convergence in Neutrosophic Normed Spaces

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Abstract. In this paper, we have introduced the concept of rough Cesaro-Euler statistical convergence for sequences in neutrosophic normed spaces as a significant convergence criterion. Neutrosophication effectively manages components that are partially dependent, partially independent, or entirely independent in real-world scenarios. By exploring various properties of rough Cesaro-Euler statistical convergence in these spaces, we offer valuable functional tools for dealing with inconsistencies and uncertainties in practical applications. Additionally, we have derived several equivalent conditions concerning the set of statistical limit points and cluster points for sequences that are roughly statistically convergent in these spaces.

Keywords: Rough Cesaro-Euler statistical convergence, Generalized Cesaro-Euler summability method, two normed spaces.

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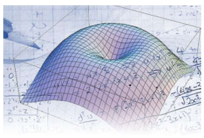

Mathematical Modeling of Price Dynamics and Inventory Management

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Abstract: This study addresses the challenges of price and inventory management for a product (Olim sunflower oil 1L) that is marketed in one of the "SPAR" supermarkets in the city of Durrës through a differential mathematical model. Applications of differential systems are now used in motion and change modeling in all fields of science. The theory of differential equations has become an essential tool in economic analysis. Data were collected for a period of 7 months and we used data analysis methods to determine the coefficients of the equations for the production and sales model. Through the differential systems solution, the model aims to achieve a stable inventory level and a stabilized price. These models can now be used to predict the amount of sales and production depending on prices and price changes in future periods. The model is useful for understanding market dynamics and assisting in strategic decision-making around pricing and production.

Keywords: Mathematical model, Differential system, Stability, Production, Sales.

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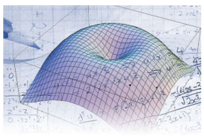

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Computational Approaches to Animal Behavior: Mathematical Modeling and Machine Learning Methods

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Abstract: This study explores the complexities of animal decision-making in T-maze environments by integrating computational modeling with machine learning techniques. Specifically, we focus on the binary decision-making process in T-mazes, analyzing how animals choose between two paths. Our research utilizes a mathematical model designed to capture the decision-making behavior of fish, providing analytical insights into their intricate behavioral patterns. Additionally, we employ advanced machine learning algorithms to analyze behavioral data from zebrafish and rats. The combination of these techniques yields high predictive accuracies, demonstrating the effectiveness of computational methods in decoding animal behavior in controlled experiments. This study not only enhances our understanding of animal cognitive processes but also highlights the crucial role of computational modeling and machine learning in advancing behavioral science.

Keywords: Modelling, Functional equations, Machine learning methods.

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ON NORLUND SUMMABILITY OF TAYLOR SERIES IN WEIGHTED DIRICHLET SPACES

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Abstract. We show that in a weighted Dirichlet space D_ω for any $\alpha > 0$ there exists sequence of Norlund operators (N_n^α) such that the Taylor series of a holomorphic function in D_ω is Norlund summable with respect to(N_n^α).

Keywords: Dirichlet space, Norlund mean, Hadamard multiplication, Hardy space.

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Generalized Tempered Fractional Simpson-Type Integral Inequalities Using Differentiable n-Polynomial Convex Functions and Their Applications

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Abstract: In this paper, the author established an identity for differentiable functions using generalized tempered fractional integral operators. By applying this identity and the well-known Hölder's, and power-mean inequalities, some new Simpson-type inequalities for differentiable n-polynomial convex functions are obtained. Furthermore, several special cases for suitable choices of functions are deduced. Finally, applications to the q-digamma function and modified Bessel function of the second kind are presented.

Keywords: Generalized tempered fractional integral operators, Simpson-type inequality, n-polynomial convex function, Hölder's inequality, Power-mean inequality, q-digamma function, Modified Bessel function.

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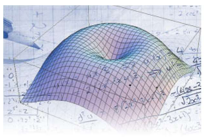

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TRANSFORMIMI I VALËZËS NË PËRPUNIMIN E SINJALEVE

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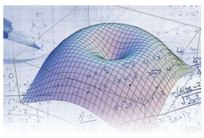
Përmbledhje: Analiza e valëzës është një mekanizëm shumë i mirë në përpunimin e sinjaleve. Transformimi i valëzës përkthen paraqitjen në amplitudë –kohë të një sinjali në paraqitjen frekuencë- kohë e cila është e përfshirë në një bashkësi koefiçientësh të valëzës. Këto koefiçientë të valëzës mund të përdoren në varësi të frekuencës në mënyrë që të arrijmë në efekte të ndryshme të përpunimit të sinjaleve. Transformimi i anasjellë i valëzës mund të ndryshojë koefiçientët e përpunuar të valëzës në gjendjen e tyre të mëparshmë pra në paraqitjen amplitudë-kohë më qëllimin e përftimit të një sinjali të modifikuar. Në këtë punim kemi paraqitur shkurtimisht transformimin Fourier dhe atë të valëzës, dhe më pas kemi përshkruar valëzën Haar. Gjithashtu kemi bërë disa aplikime të valëzës në përpunimin e sinjaleve me ndihmën e MATLAB-it.

Abstract: Wavelets are very good for analyzing and processing digital signals. The wavelet transform translates the time-amplitude representation of a signal to a time-frequency representation that is enclosed as a set of wavelet coefficients. These wavelet coefficients can be modified in a frequency-dependent manner to achieve various digital signal processing effects. The inverse wavelet transform can then convert the manipulated wavelet coefficients back to the normal time-amplitude representation in order to yield a modified signal. After an overview of Fourier and wavelet transforms, described in this paper the Haar wavelet. Several signal processing and musical applications of wavelets, including denoising, wavelet filtering, and data compression, are investigated using MATLAB.

Fjalëkyçe: Transformimi i valëzës, valëza Haar, transformimi Fourier, efekte dixhitale.



Formulas Derived from Exponential Euler Splines and Special Polynomials

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Abstract: In [6], we defined the exponential Euler-type splines of complex order with the aid of the beta-type rational functions, the Frobenius Euler numbers and polynomials. The aim of this presentation is to not only investigate some properties of these splines but also give partial derivatives of special polynomials involving beta-type rational functions and Frobenius Euler numbers.

Keywords: Frobenius Euler numbers and polynomials, Exponential Euler Spline, Special numbers and polynomials, Generating functions, Beta-type rational functions.

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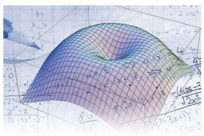

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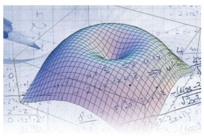

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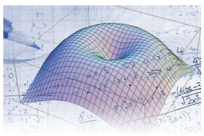

GAUSSIAN CURVATURE CONJECTURE FOR MINIMAL GRAPHS

David Kalaj

In this talk we present a recent solution of longstanding Gaussian curvature conjecture of a minimal graph S over the unit disk ([1]). This conjecture states the following. For any minimal graph lying above the entire unit disk, the Gaussian curvature at the point above the origin satisfies the sharp inequality $|K| < \frac{\pi^2}{2}$. The conjecture is first reduced to the estimation of the Gaussian curvature of certain Scherk type minimal surfaces over some bicentric quadrilaterals inscribed in the unit disk containing the origin. Then we make a sharp estimate of the Gaussian curvature of those minimal surfaces over those bicentric quadrilaterals at the point above the zero. Our proof uses complex-analytic methods since minimal surfaces that we consider allow conformal harmonic parametrization.

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REGULARITY VS. COMPACTNESS

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Abstract: A well-known result by Cohen and Dunford (1937) [1] states that a regular bounded linear operator cannot be compact. This means that a bounded linear operator from the space of all convergent complex numbers into itself that preserves the limits cannot be compact. We gave a new proof in of this result which applies the theory of BK spaces from summability and uses the Hausdorff measure of noncompactness. Furthermore, we present similar recent results involving the spaces of sequences that are strongly summable by the Cesàro method of order 1, and strongly convergent, respectively [2].

Keywords: BK spaces, Hausdorff measure of noncompactness, regular and compact operators

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ON MODULUS WEIGHTED STATISTICAL CONVERGENCE IN PARTIAL METRIC SPACES

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Abstract. Modulus statistical convergence has been examined across various broad frameworks, including topological and uniform spaces. This paper extends the concept by defining and analyzing modulus weighted statistical convergence within the context of partial metric spaces. Partial metric spaces provide a unique setting that differs from traditional metric spaces, allowing for a broader exploration of convergence behaviors. We delve into how modulus weighted statistical convergence operates in these spaces and the implications for understanding convergence in more complex structures. This investigation opens up new avenues for studying convergence in non-standard mathematical environments.

Keywords: f -weighted statistical convergence; modulus function; partialmetric space.

MSC: 46B15; 40A05; 46B45

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INVARIANT LACUNARY STRONG SUMMABILITY OF WEIGHT N IN SEMINORMED SPACE

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Abstract: In this paper we introduce the concept of q - invariant lacunary statistical convergence of weight g. We primarily investigate some relations between q - invariant lacunary statistical convergence of weight g and strong $N(\theta,\sigma,q)$ summability of weight g and then the relations between the spaces $N[\theta,\sigma,f,q,p]^g$ and $S(\theta,\sigma,q)^g$.

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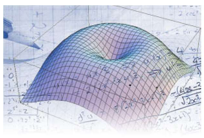

SPECIAL POLYNOMIALS DERIVED WITH INVERSE OPERATORS AND THEIR APPLICATIONS

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Abstract: The aim of this presentation is to use hypergeometric series and the inverse difference operator Δ^{-1} to investigate some properties of the numbers $y_6(m,n;\lambda,p)$, which known as combinatorial Simsek numbers of the sixth kind defined in [7]. By applying the operator Δ^{-1} to definition of the numbers $y_6(m,n;\lambda,p)$, some novel formulas are derived. These formulas are contained the numbers $y_6(m,n;\lambda,p)$, the Stirling numbers of the second kind, and the Bernoulli polynomials.

Keywords: Difference operator, Inverse operator, Shift operator, Bernoulli polynomials, Stirling numbers, Combinatorial numbers, Generating functions

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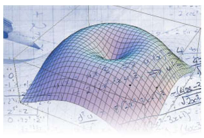

A FULL CHARACTERIZATION OF BOCHNER INTEGRAL ON ℓ_∞

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Abstract. In this paper, we present a full characterization of Bochner integrable functions from to Ω to ℓ_∞, where $(\Omega, \sum, \mu)$is a complete probability space and ℓ_∞ is the Banach space of numeric bounded sequences.

Keywords: Countable additive measure, complete probability spaces, Bochner integrable functions, sequence of functions uniformly integrable

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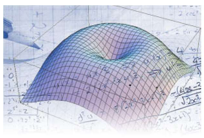

SOME OPERATORIAL INEQUALITIES AND ITS APPLICATIONS

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Abstact: In this paper we will prove some operatorial inequalities for operator monotone functions, hyponormal operators, paranormal operators and normal operators. Let $A, B, X \in B(H)$ are such that A and B are strictly accretive. Those inequalities that we will prove, will be completed under some certain conditions such as : Both of operators A and B are normal, at least one of them is normal and some similary other conditions.

Keywords: Operator monotone function, normal operators, paranormal operators, hyponormal operators.

SOME RESULT OF NORLUND-CESARO WEAK STATISTICAL CONVERGENCE

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Abstract: The goal of this work is to introduce the concept of weak Nörlund-Cesàro statistical convergence in normed spaces. Additionally, the study delves into several distinct properties of this type of convergence.

Keywords: Statistical vonvergence, Week norlund-cesaro statistical convergence, Norlund-cesaro summability.

2010 Mathematics Subject Classification: 40A05, 40D25, 40G05, 40G15

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ON n-QUASI SKEW $[m, c]$-SYMMETRIC OPERATORS

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Abstract: Let T be a bounded linear operator on a complex Hilbert space H. In this paper we introduce a new class of operators: An operator $T \in L(H)$ is said to be n-quasi skew $[m, C]$-symmetric operators if

$$T^{*n}\left(\sum_{j=0}^{m}\binom{m}{j}CT^{m-j}CT^{j}\right)T^{n} = O$$

for some positive integers m and n. In this paper, some basic structural properties of n-quasi $[m, C]$-isometric operators are established with the help of operator matrix representation.

Keywords: On n-quasi skew $[m, C]$-symmetric operators;

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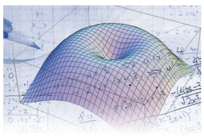

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ANALYSIS OF WEAK ASSOCIATIVITY IN SOME HYPER-ALGEBRAIC STRUCTURES THAT REPRESENT REDOX REACTIONS.

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Abstract: In this paper, some chemical systems of Americium (Am), Titanium (Ti) and Gold (Au) which are represented by hyper-algebraic structures $(SAm,\oplus), (STi,\oplus)$ and $(SAu,\oplus)$ were studied. The analyses of their algebraic properties and the probabilities of elements in redox reactions were carried out. It was shown that in the redox reactions, the left nuclear (N_λ)-probability, middle nuclear (N_μ)-probability and right nuclear (N_ρ)-probability for each of the hyper-algebraic structures $(SAm,\oplus), (STi,\oplus)$ and $(SAu,\oplus)$ is less than 1.000. This implies that, $(SAm,\oplus), (STi,\oplus)$ and $(SAu,\oplus)$ are non-associative hyper-algebraic structures. Also, from the results obtained for FLEX-probability, it was shown that, $(SAm,\oplus), (STi,\oplus)$ and $(SAu,\oplus)$ have flexible elements because the values of their FLEX-probabilities are 1.000 each. Hence, $(SAm,\oplus), (STi,\oplus)$ and $(SAu,\oplus)$ are flexible.

2020 Mathematics Subject Classification. 20N20, 20N05

Keywords and Phrases : Hypergroup, Polygroup, Polyloop.

APPLICATIONS OF P-ADIC INTEGRALS TO A UNIFICATION AND GENERALIZATION OF THE PETERS-TYPE SIMSEK POLYNOMIALS

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Abstract: The main aim of this study is to obtain p-adic integral formulas for a unification and generalization of the Peters-type Simsek polynomials, recently introduced by the author [12]. By applying p-adic integration, we get various integral formulas and accordingly new identities involving the Peters-type Simsek numbers and polynomials, the Daehee numbers and the Changhee numbers. Lastly, we finalize this paper by providing a few applications and comments on the findings of this study.

Keywords: Generating functions, p-adic integration, Integral formulas, Special numbers and polynomials, Daehee numbers, Changhee numbers, Peters-type Simsek numbers and polynomials.

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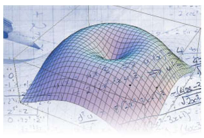

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ON THE DISCRETE-TIME RICCATI EQUATIONS

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Abstract: The algebraic Riccati equation is widely applied to various engineering areas such as signal processing and, especially, control theory. In the area of control systems analysis, this equation plays important roles in system stability analysis and optimal controllers, the transient behaviour estimates, etc. Computing the exact solution of the Riccati equation may be either impossible, or impractical, or even not necessary required, in some practical cases. The problem to find bounds to the solution of this equation has been intensively studied in the past two decades. But most of the papers consider the finite dimension case.In this paper, we propose new upper and lower bounds for the solution of the infinite dimensional discrete-time Riccati equation, and we give some applications in the robust stabilization problem.

Keywords: Riccati equation, Hilbert space, discrete-time system, stability.

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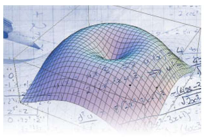

Estimation of some exponential sums and application to number theory

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Abstract: Exponential sums often appear in number theory problems. Initially Weyl and van der Corput introduced some thechniques for estimating exponential sums. We will be interested in estimationg exponential sums over finite fields with the aim, of applying to problems of differences between prime numbers

Keywords: exponential sums, prime numbers.

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Approximation Properties of Kantorovich Type Sampling Series in Weighted Spaces of Functions

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Abstract: In this talk, we study Kantorovich type sampling series in weighted spaces of functions. We investigate the approximation properties of the newly introduced operators, presenting convergence results and providing a quantitative form of the convergence via weighted modulus of continuity.

Keywords: Sampling type series; weighted approximation, Voronovskaja type theorem.

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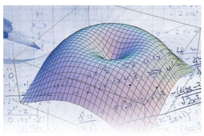

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On Generalized Deferred Statistical Convergence

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Abstract: The main purpose of this work is to introduce and examine the concept of deferred statistical convergence of order (α,β) and give some relations about this concept.

Keywords: Deferred Statistical Convergence; Statistical Convergence.

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A Note on Color Palindrome Composition

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Abstract: In this paper, we decompose the palindrome composition set of the positive integer. We also develop techniques to investigate generating functions for the numbers of color palindrome compositions with respect to some coloring rules. Moreover, by using decompositions, we make patterns of some color palindrome compositions.

Keywords: Compositions of the positive integers, Palindrome compositions, The color palindrome compositions, Generating function.

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PERIODIC SOLUTIONS OF A STATE DEPENDENT DELAY DIFFERENTIAL EQUATION

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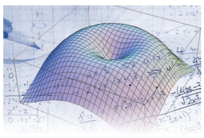
Abstract: Functional differential equation with state-dependent delays (sd-FDEs), (that is, delays which depend upon the unknown solution), appear frequently in applications as model equations (see, e.g., [1],[2],[3],[7]) and the study of such equations is an active research area (see, e.g., [4],[5],[6]). In this talk, we are intersted in the study of the equation

$$\begin{cases} \dot{x}(t) = f\left(x\left(t-\tau(t)\right)\right) \\ \epsilon\dot{\tau}(t) = g\left(x(t)-\tau(t)\right) \end{cases} \qquad (0.1)$$

An adequate initial condition for the equation (0.1) is $(\phi, \tau_0) \in C([-\tau_2, 0], \mathbb{R}) \times [\tau_1, \tau_2]$. The couple $(x, \tau): [-\tau_2, \alpha] \to \mathbb{R} \times [\tau_1, \tau_2]; t \mapsto \left(x(t), \tau(t)\right)$ is a solution of the equation (0.1) if $x_{|_{[-\tau_2,0]}} = \phi, \tau(0) = \tau_0$ and $\left(x(t), \tau(t)\right) \in C([0, \alpha], \mathbb{R} \times [\tau_1, \tau_2])$ satisfies the equation (0.1). If furthermore $x(t)$ is periodic with period ω the solution is said to be periodic. It is called slowly oscillating periodic solution if it has precisely two zeros, z_1, z_2, in $[0, \omega]$, both simple, $0 < z_1 < z_2 < \omega$, with $z_2 - z_1 > \tau_2$. The main topic of this talk is the existence of slowly oscillating periodic solutions.

Key words and phrases: parabolic equations; evolution problems; nonautonomous operator; Weak solutions; delay term.



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Integral Formulas Involving r-Parametric Hermite-Based Milne-Thomson Type Polynomials

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Abstract: The aim of this presentation is to study some properties of the r-parametric Hermite-based Milne-Thomson type polynomials. We give some integral formulas for the r-parametric Hermite-based Milne-Thomson type polynomials. By applying the integral operator to the generating functions of these polynomials, we obtain some formulas and identities for them. Moreover, when some special cases of these results are examined, we present some relations that include these polynomials.

Keywords: Hermite polynomials, r-parametric Hermite-based Milne-Thomson type polynomials, Integral operator, Generating functions.

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On the Study of Polyquasigroups and Its inverse property

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Abstract: We study the hyperalgebraic structure, namely polyquasigroups and examine its inverse property. Also, we establish a condition for a polygroupoid which satisfies a generalized identity to be a polyquasigroup.

Keywords: Polyquasigroup, Polygroupoids

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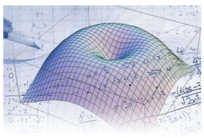

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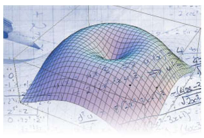

Fixed Point Results on Ultrametric Space

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Abstract: Fixed point theory is an active and important branch of mathematics, and this theory is a powerful tool for investigating solutions to mathematical problems with various types of applications. Because of its simple application to several disciplines of mathematics, Banach [1] proposed the Banach fixed point theorem a century ago, which is a crucial source for the development of metric fixed point theory. Banach's result has a crucial role in the theory in view of to present a way to find the fixed point of corresponding mapping as well as its existence and uniqueness. After the remarkable applications of fixed point theory in many branches, especially, integral equations, differential equations, numerical analysis, graph theory, etc., the theory has been extensivelly studied by researches for different contraction mappings in different type spaces. Among the others, here, we consider one of these considerations presented by Gajic [2] on ultrametric space.The space, roughly speaking, is a special type of a metric space which is constructed by a stronger triangular inequality than classical ones. Considering the spherically completeness of a given ultrametric space, Gajic [2] obtained a fixed point theorem with uniqueness for the mappings. In this talk, we give some fixed point theorems for contractive type mappings on a spherically complete ultrametric space and give some corollaries and examples.

Keywords: Fixed point, F-contraction, ultrametric space.

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On Lacunary Strongly Summable Functions Concerning Orlicz Function

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Abstract: Borwein [1] introduced and studied strongly summable functions, strongly summable sequences. On the other hand, Lindenstrauss and Tzafriri [3] used the idea of Orlicz function to construct the sequence space. The main goal of this paper is to present a new concept of lacunary strongly summable functions with respect to Orlicz function. To accomplish this aim we will consider real valued function which is measurable on (1,∞) and the concept of lacunary strongly convergence that was presented by Fridy and Orhan [2]. Additionally, Some improvements of the results have been obtained.

Keywords: Orlicz function, measurable functions, lacunary sequence, strongly summable functions.

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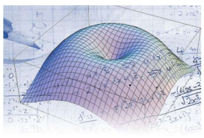

Maximum Revenue for Polygonal Fuzzy Numbers using the Graded Mean Defuzzification Method

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Abstract: Let $R(x) = ax - bx^2$ be the revenue function where x denotes the quantity and a and b are constants. In this talk, we fuzzify these constants using the polygonal fuzzy numbers. Then we calculate the revenue in the fuzzy sense. In the defuzzification step graded mean defuzzification method is used.

Keywords: Fuzzy Revenue, Polygonal Fuzzy Number, Graded Mean Defuzzification Method

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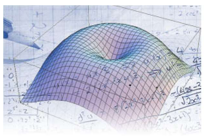

ON QUASI-DOMINANT OPERATORS

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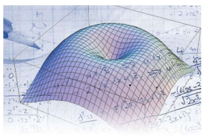
Abstract. In this paper, we introduce a new class of operators, the so-called quasi-dominant operator class. This class includes hyponormal operators, M-hyponormal operators, and dominant operators. Our results are based on several known properties of k-quasi-M-hyponormal operators [21] and then on properties of normal operators. We also study the local spectral properties of this operator class.

2020 Mathematics Subject Classification. 47A30, 47B47, 47B20.

Key words and phrases. Hyponormal operators, Dominant operator, Unilateral shift operator, Douglas theorem, SVEP, Bishop's property.



On a first order iterative differential inclusion

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Abstract: Several results of iterative differential equations were found using various conditions, we refer to [2,3,5,6]. Since the devolppement of such equations, generalized problems arised with the recent works [1,3] which are iterative differential inclusions. Our main purpose of the present work is to evolve the problems discussed in the papers mentioned above and show the existence of solutions for a new class of differential inclusion problem governed by a time dependent maximal monotone operator with an iterative perturbation. We first show the existence of solutions for an iterative differential equation by applying Schauder's fixed point theorem to apply the result found in proving an existence result for our problem using the Yosida reguralisation technique. Furthurmore, we demonstrate the existence of an absolutely continuous solution under weaker condition than the one used previously which is a linear growth condition.

Keywords: Iterative, Differential inclusions, Maximal monotone operator, Perturbation

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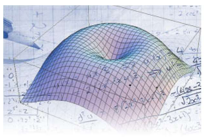

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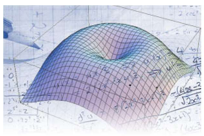

On semi-symmetric (α, β, γ)-inverse quasigroup

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Abstract: Quasigroups and loops are generalizations of groups (see [3]). Some classes of quasigroups and loops have been studied and found to be application to cryptography (see [2]). One of such is the (r, s, t)-inverse quasigroup (see [1]) which (α, β, γ)-inverse quasigroup generalizes. A quasigroup (Q,·) will be called an (α, β, γ)-inverse quasigroup, if there exist fixed permutations α, β and γ of Q, such that $(x \cdot y)\alpha \cdot x\beta = y\gamma \ \forall \ (x, y) \in Q \times Q$. Examples were given to illustrate that a quasigroup can have more than one (α, β, γ)-inverse property. Consequently, for a set ΔQ of such triples, it was shown that if the semi-symmetry law holds in (Q,·), it induces a binary operation on ΔQ for which ΔQ is a group. Interestingly, this leads to an isomorphism between ΔQ and the autotopism group of (Q,·).

Keywords. Groups, quasigroup, loops, (r,s,t)-inverse quasigroup and loop, (α,β,γ)-inverse quasigroup.

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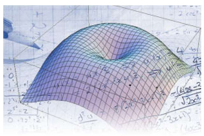

On probability distribution of Rice-Middleton model

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Abstract. The probability density function in Rice-Middleton model, which describes the behavior of the single sinusoidal random signal combined with Gaussian noise is expressed in three independent ways: (i) by an integral representation of the modified Bessel function of the first kind of integer order; (ii) applying a hyperbolic cosine differential operator and (iii) using Grünwald-Letnikov fractional derivative. The cumulative distribution function is also given in all these cases, and also using the Nuttall Q-function. An associated probability distribution is introduced which cumulative distribution function, the raw moments of general real order are obtained, whilst the characteristic function's power series form is inferred. The exposition ends with a discussion in which by-product summations are given for the considered Neumann series of the second type built by modified Bessel functions of the second kind having integer order.

Keywords: Grünwald-Letnikov fractional derivative; PDF and CDF of Rice-Middleton model; Bessel Iv function; Neumann-Bessel series; Nuttall Q-function; Srivastava-Daoust S function.

MSC(2020): 33C10, 40A30, 40H05, 60E05, 60E10, 62E15

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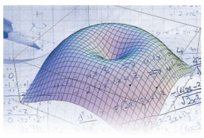

Weighted Approximation by Bivariate Exponential Type Sampling Series

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Abstract: In this presentation, we introduce the bivariate logarithmic weighted spaces for continuous functions and investigate the approximation properties of bivariate exponential sampling series in these spaces. Furthermore, we give pointwise and uniform convergence of the series and then obtain the rate of convergence by introducing a suitable modulus of continuity for functions belonging to bivariate logarithmic weighted spaces of continuous functions. Additionally, in order to obtain rate of pointwise convergence, we estimate the remainder of the Mellin-Taylor formula using the modulus of continuity and present a quantitative form Voronovskaja type theorem. Finally, we present some graphical representation of the approximation of continuous functions by bivariate exponential type sampling series using kernels which satisfy certain assumptions.

Keywords: Exponential sampling series; rate of convergence; Mellin Taylor formula; Voronovskaja type theorem.

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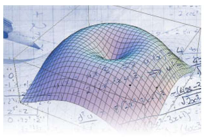

A certain family of Polynomials associated with Applications of Operators and p-adic Integrals

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Abstract: In [11], the author defined new classes of special numbers. In his paper, the author gave open problems. The theme of this presentation is to study not only these problems, but also these special numbers by blending p-adic integral with operators including difference and shift operators and to investigate the basic properties of this class. It is aimed to examine some properties of the formulas and generating functions obtained with the help of these operators and integrals. Moreover, the relations of the generating functions of the special numbers for these classes are investigated and as a result of these, new formulas and relations are derived.

Keywords: Bernoulli numbers and polynomials, Stirling numbers, Operators, Special numbers and polynomials, Generating functions, p-adic integrals.

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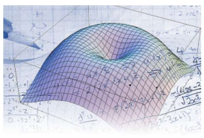

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Fractional Multistep Differential Transformation Method used to analyze a modified form of fractional order Lorenz system

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Abstract: Dynamics of nonlinear fractional-order Lorenz system is investigated by employing Fractional Multistep Differential Transformation Method (FMDTM). In order to illustrate the new technique, the numerical algorithm is applied in the 3D solution of modified Lorenz system by adding the forth varied parameter d, considered as a highly simplified model for the weather. Parameter fixed dynamical analysis method and chaos diagram are used. Results show that the fractional order Lorenz system has rich dynamical behavior and it is a potential model for application. Investigation of dynamics is realized by fixing the parameters $a = 40, b = 3, c = 10$ (system has chaotic behavior) and by changing the added parameter $d \in [5,38]$, implemented with the aid of Mathematica symbolic package. For $, d = 25$, the minimal fractional order, for which the system shows chaotic behavior is $\nu = 0.8726$, for $\nu = 0.998$, the minimal value of d, for which system shows chaotic behavior is $, d > 12{,}05219$. The fractional derivatives are described in the Caputo sense. Based on FMDTM, is shown that the system has rich dynamical characteristics, it changes from a non-chaotic system to a chaotic one, using fractional order $\nu \in (0,1)$. The method deals with the approximated solutions to integer-order differential equations and is based on polynomial approximations, with good results (based on numerical experiments) for fractional order closed to 1.

Keywords: Caputo fractional derivative, modified Lorenz system, Fractional Multistep Differential Transformation Method (FMTM), nonlinear system, dynamical behaviour.