7TH INTERNATIONAL EURASIAN CONFERENCE ON MATHEMATICAL SCIENCES AND APPLICATIONS
FOREWORD

I welcome you to the 7th International Eurasian Conference on Mathematical Sciences and Applications held August 28-31, 2018 in Kyiv, Ukraine. IECMSA-2018 is supported by Sakarya University, National University of "Kyiv-Mohyla Academy", Taras Shevchenko National University of Kyiv, Kocaeli University, Namik Kemal University, Amasya University, Baku State University, Institute of Applied Mathematics, Turkic World Mathematical Society, and International Balkan University.

The series of IECMSA provides a highly productive forum for reporting the latest developments in the researches and applications of Mathematics. The previous six conferences held annually since 2012 in Kosovo, Bosnia and Herzegovina, Austria, Greece, Serbia, and Hungary. On the basis of the impact of these remarkable conferences, IECMSA-2018 has witnessed significant growth. The scientific committee of IECMSA-2018 accepted 184 oral (63%) and 16 poster (50%) presentations. The authors of submitted presentations come from 44 countries. Authors of accepted presentations are from 26 countries. The scientific program of the conference features invited talks, followed by contributed oral and poster presentations in parallel sessions.

The conference program represents the efforts of many people. I would like to express my gratitude to all members of the scientific committee, sponsors and, honorary committee for their continued support to the IECMSA. I also thank the invited speakers for presenting their talks on current researches. And finally, I would like to sincerely thank all participants of IECMSA-2018 for contributing to this great meeting in many different ways. I believe and hope that each of you will get the maximum benefit from the conference.

Welcome to Kyiv!
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INVITED SPEAKER
Diagonal Limits of Discrete Structures

Bogdana Oliynyk

Abstract. Diagonal constructions play essential role in modern mathematics and, more specifically, in algebra and discrete mathematics. Probably, the first usage of diagonal ideas belongs to Ernst Steinitz (see [5]). He introduced so-called supernatural numbers to classify algebraic closures of finite fields. After that many other properties and applications of diagonal constructions were obtained.

The most prominent results involving diagonal ideas include diagonal limits of group algebras and rings, diagonal limits of permutation groups (see [4], [6]). The recent results show how these ideas can be used to construct metric spaces as diagonal limits of Hamming spaces (see [4], [5]).

In this talk we discuss diagonal limits of groups and metric spaces. We consider families of diagonal limits of monomial groups and Hamming metric spaces that are parametrized by supernatural numbers, and discuss connection between them.

Keyword: diagonal limit, monomial group, supernatural number, Hamming space.

References


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Holomorphic Statistical Manifolds

Cengizhan Murathan

Abstract. In 1985, Amari introduced the notion of statistical structure which takes an important area in information geometry. This kind of structure includes the context of dual connections which are called conjugate connection in affine geometry. Also this structure can be seen generalization of Riemannian structure. In this study, we recall statistical manifold and then lead to holomorphic statistical manifolds which includes Kaehler statistical, Sasakian statistical, Kenmotsu and cosymplectic statistical manifolds.

Keyword: Almost contact manifold, statistical manifold, conjugate connection Kaehler statistical manifold, Sasakian statistical manifold, Kenmotsu statistical manifold.


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What is a Fractional Operator: A Point of View

Dumitru Baleanu

Abstract. Fractional calculus means the study of so-called fractional order integral and derivative operators over real or complex domains and their applications. Recently, the fractional differentiation has drawn increasing attention in the study of the anomalous social and physical behaviors, where the scaling power law of the fractional order arises universal as an empirical characterization of such complex phenomena. In my talk I will discuss the important open question called what is a fractional operator?

Keyword: fractional calculus, Caputo derivative, Mittag-Leffler kernel.


References


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CATEGORICAL CLOSURE OPERATORS AND THEIR APPLICATIONS

Dikran Dikranjan 1

Abstract. Closure operators have been used in mathematics since more than a century (Birkhoff and Kuratowski should be mentioned here), yet the categorical closure operators were explicitly introduced only in [1, 2], inspired by the pioneering work of Isbell [4] (in universal algebra) and Salably [5] (in topology). Due to their very simple and flexible definition, they can be defined in all categories of interest in mathematics (sets, groups, rings, modules, topological, uniform and quasi-uniform spaces, graphs, etc. [2]). This has been used in the numerous applications, for example in the study of closed/dense subobjects, epimorphisms, compactness, injectivity, separation and connectedness properties, torsion theories in algebra, etc.).

As a typical example one can mention the categorical compactness that can be defined by using a closure operator, inspired by an idea of Manes and Kuratowski. Mrowka closed projection theorem (see [1] for details). This led to a long series of research papers of T. Fay and coauthors, dedicated to categorical compactness in categories of abstract modules, groups or rings. In the case of topological groups, this notion of compactness (shortly named c-compactness) has been studied in great detail [3]. In this case one can compare c-compactness with the standard notion of compactness. Compact groups are c-compact, but the question of whether c-compact groups are compact, raised in [3], remained open until a few years ago (that the answer is in the positive for solvable was shown in [3]). Recently Klyachko, Ol’shankij and Osin [6] found examples of (even discrete) c-compact groups that are not compact (finite, in this case). This is closely related to the celebrated non-discrete topologization problem of Markov.

Keyword: closure operator, compact space, epimorphism.


References


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Evaluating Journals Performance over Time Using Functional Instruments

Fabrizio Maturo 1, Šárka Hošková-Mayerová 2

Abstract. In recent years, scientific research has become a business for many actors involved, particularly for journals’ publishers. Therefore, there is a great increase in those studies looking for advanced methods for evaluating the impact of scientific journals in various scientific communities.

Most of the indicators used in the literature for this purpose are very simple indexes, such as the number of citations, number of articles, SCImago Journal Rank, and h-index. In this research, we suggest the use of functional data analysis to obtain new advanced statistical indicators starting from the classical bibliometric indexes. Specifically, we will show through an application to real data how to use functional data analysis to add interesting insights via the analysis of classical bibliometric indexes.

AMS 2010: 97K80, 32A70.

References

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Abstract. A spatial potential solenoid field symmetric with respect to the axis $Ox$ is described in a meridian plane $xOr$ in terms of the axial-symmetric potential $\varphi$ and the Stokes flow function $\psi$ satisfying the following system of equations:

\[ r \frac{\partial \varphi(x, r)}{\partial x} = \frac{\partial \psi(x, r)}{\partial r}, \quad r \frac{\partial \varphi(x, r)}{\partial r} = -\frac{\partial \psi(x, r)}{\partial x}. \]

We established relations between axial-symmetric potential solenoid fields and principal extensions of complex analytic functions into a special topological vector space (see [6]) containing an infinite-dimensional commutative Banach algebra (see [1]). In such a way we substantiated a method for explicit constructing axial-symmetric potentials and Stokes flow functions by means of components of the mentioned principal extensions and established integral expressions for axial-symmetric potentials and Stokes flow functions in an arbitrary simply connected domain symmetric with respect to an axis. These integral expressions enable to develop methods for effective solving boundary problems for axial-symmetric potential fields having various applications in the mathematical physics (see [2, 3, 4, 5]).

We consider axial-symmetric stationary flows of the ideal incompressible fluid as an important case of potential solenoid vector fields.

The mentioned integral expression of Stokes flow function is applied for solving boundary problem about a streamline of the ideal incompressible fluid along an axial-symmetric body. We obtain criteria of solvability of the problem by means distributions of sources and dipoles on the axis of symmetry and construct unknown solutions using multipoles together with dipoles distributed on the axis.

Keyword: axial-symmetric potential, Stokes flow function, streamline, monogenic function.


References


GROWING NUMBER OF PUBLICATIONS AND SYMMETRY-BASED RESPONSE

Vladimir V. Kisil

ABSTRACT. Mathematics uses abstract models to answer various practical questions. There is an emerging problem, which threatens a successful development of mathematics itself.

A stable exponential growth of mathematical publications was observed over decades [5, 6]. Recently, the growth was noticeably accelerated by various factors from advances in digital technologies to increasing bureaucratic pressure “publish-or-perish”. Moreover, there is a positive feedback link: unmanageable amount of information provokes multiple re-discovery and re-publication of the same results, expanding the wast sea of literature even further.

The traditional tools like keywords and subject classifications are only partially helpful. Coherent states, wavelets, voice transform—are examples of keywords which represents essentially the same mathematical object. The following codes from AMS Mathematical Subject Classification present some (but not all) topics, which are related to the Schrödinger group (also known as the bi group):

- 05A40 Umbral calculus
- 11G15 Complex multiplication and moduli of abelian varieties
- 14K25 Theta functions
- 22E45 Representations of Lie and linear algebraic groups over real fields: analytic methods
- 33E05 Elliptic functions and integrals
- 35R03 Partial differential equations on Heisenberg groups, Lie groups, Carnot groups, etc.
- 47G30 Pseudodifferential operators
- 70H15 Canonical and symplectic transformations
- 81R30 Coherent states; squeezed states

An extension of the Klein’s Erlangen programme beyond the initial geometric framework provides a better classification based on respective symmetry groups. In this talk we discuss some relevant examples of hidden connections between different fields [1, 2, 3, 4].

Keyword: Symmetry, Erlangen programme, group representations.

AMS 2010: 00A35, 20G99.

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To Hopf’s Conjecture about Metric on the Topological Product $S^2 \times S^2$
of two 2-Spheres

Yu. A. Aminov

Abstract. Hopf’s well-known conjecture states that there exists no metric of strictly positive curvature on the topological product $S^2 \times S^2$ of two 2-spheres. Note that by Preissmann’s theorem in [1] on the topological product $M \times N$ of two compact differentiable manifolds there exists no metric of strictly negative curvature. In [2] M.Berger showed that if the sectional curvature $K$ of a metric on the $S^2 \times S^2$ satisfies the inequalities $\delta \leq K \leq 1$, then $\delta < \frac{4}{17}$. Two articles by J.-P.Bourguignon, A.Deshamps and P.Sentenac were devoted to this problem.[3-4]. Here we expose some theorems from our article [5]. We apply the stability theory of minimal surfaces to Hopf’s problem. Saks and Uhlenbeck [6] proved that if the second homotopy group $\pi_2(M) \neq 0$, then there exists a set generating $\pi_2(M)$ and consisting of conformally minimal branched immersions of spheres that minimize energy and area in their homotopy classes. The group $\pi_2(S^2 \times S^2)$ has two generators. We denote the 2-dimensional minimal cycles realizing them by $F_1$ and $F_2$.

A theorem of T.Frankel about the intersection of compact completely geodesic submanifolds in a Riemannian space $M$ of positive curvature in the case where the sum of dimensions of these submanifolds is no lower than the dimensions of $M$ has been generalized both to minimal and saddle surfaces; see [7,8]. Therefore, we can assume that the cycles $F_1$ and $F_2$ have a common point $P_0$. Moreover, we assume that their tangent planes at this point are orthogonal. Our further considerations are performed in neighborhood of this point and related to the stability of both minimal cycles.

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Consider a metric on $M$. Now we give examples of metrics on $g$ which gives an example of such manifold.

If, on the topological product $M = S^2 \times S^2$, holds at each point of this surface, then, at the orthogonal intersection point of the cycles, the curvature of $M$ is non positive, at least for some area element.

We denote $\nabla_{ij}$ the Laplace-Beltrami operator on the coordinate surface with the coordinates $u^i, w^j$. Then it has place

\[
(K_{13} + K_{14} + K_{23} + K_{24})H_1H_2H_3H_4 = -H_3H_4\nabla_{34}W_{12} - H_1H_2\nabla_{12}W_{34} + 2H_3H_4(\nabla H_1, \nabla H_3)|_{\phi_1} + 2H_1H_2(\nabla H_3, \nabla H_4)|_{\phi_1} - H_3H_4\frac{|\nabla g_{12}|^2}{2H_1H_2} - H_1H_2\frac{|\nabla g_{34}|^2}{2H_3H_4}.
\]

**Definition.** We say that a globally minimal surface $F_1$ is uniformly stable in the family of surfaces $u^3 = c_3, u^4 = c_4$ if the stability condition

\[
\frac{\partial^2 W_{12}}{\partial u^i \partial u^j} \geq 0, \quad i = 3, 4,
\]

holds at each point of this surface. Similar definition has place for $F_2$.

**Theorem 1.** If globally minimal cycles in the product $M = S^2 \times S^2$ are uniformly stable and the metric satisfies the condition of orthogonality, then, at the orthogonal intersection point of the cycles, the curvature of $M$ is non positive, at least for some area element.

**Theorem 2.** If, on the topological product $M = S^2 \times S^2$ with a Riemannian metric, there exist orthogonal coordinates $u^1, ..., u^4$ and all 2-dimensional coordinate surfaces $u^1 = \text{const}, u^2 = \text{const}$ and $u^3 = \text{const}, u^4 = \text{const}$ are minimal, then the integral inequality

\[
\int_M (K_{13} + K_{23} + K_{14} + K_{24})dV \leq 0
\]

holds, where $dV$ is the volume element of $M$.

We mention that by the existence of orthogonal coordinates we mean the existence of two two-dimensional foliations by 2-spheres and orthogonal coordinates on each leaf with singular point at which $g_{ii}$ may vanish. The usual product $S^2 \times S^2$ of standard spheres gives an example of such manifold.

Now we give examples of metrics on $S^2 \times S^2$ with globally minimal uniformly stable cycles. Consider a metric on $M = S^2 \times S^2$ of the form

\[
ds^2 = \Phi_1(P_1, P_2)ds_1^2 + \Phi_2(P_1, P_2)ds_2^2,
\]

(*)
where
\[ ds_1^2 = \sum_{i,j=1}^{2} a_{ij} du^i du^j, \quad ds_2^2 = \sum_{i,j=3}^{4} a_{ij} du^i du^j. \]

Let \( \Phi_i(P_1, P_2) \) be \( C^2 \) regular functions of points \( P_1 \) and \( P_2 \) on the spheres \( S_1^2 \) and \( S_2^2 \) respectively, which are positive for values of their arguments and have the form
\[ \Phi_1 = \sum_{k=1}^{p} A_k(P_1) B_k(P_2), \quad \Phi_2 = \sum_{k=1}^{q} C_k(P_1) D_k(P_2). \]

We assume that all functions \( B_k(P_2) \) have a minimum at the same point \( P_{20} \) with coordinates \( (u_3^0, u_4^0) \) and all functions \( C_k(P_1) \) have a minimum at the same point \( P_{10} \) with the coordinates \( (u_1^0, u_2^0) \). Suppose that \( A_k(P_1) \geq 0, D_k(P_2) \geq 0 \) for all \( k \).

**Theorem 3.** Metric \((\ast)\) on the topological product \( S^2 \times S^2 \) under given assumptions has nonpositive curvature at the point \((P_{10}, P_{20})\) and for some tangent area element.

**References**

Abstract. A directed graph or digraph $G$ consists of a set $V$ of vertices and a set $E$ of edges such that $e \in E$ is associated with an ordered pair of vertices. In other words, if each edge of the graph $G$ has a direction then the graph is called directed graph. The directed graph with $n$-vertices is denoted by $\Gamma_n$. In this study we give new formula for directed graph with using cycle and chains. Also we give a conjecture for energy of directed graph.

Keyword: Directed graph, Eigenvalue.
AMS 2010: 05C20, 05C50.

References


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Semigeneralized Semiderivations of Semiprime Rings

Ajda Fošner ¹, Mehsin Jabel Atteya ²

Abstract. This article focuses on the introduction the definition of semigeneralized semiderivations of semiprime rings as an additive mapping $D : R \rightarrow R$ is called a semigeneralized semiderivation associated with a semiderivation $d : R \rightarrow R$ and the functions $h, g : R \rightarrow R$ if for all $x, y \in R$, $D(xy) = D(x)h(y) + g(x)d(y) = D(x)g(y) + h(x)d(y)$. In fact, we divided this article into three sections where in first we study and investigation some results concerning semigeneralized semiderivations of semiprime rings $R$ where we find after $R$ admits to satisfying some conditions contains weakly semiprime ideal. In the second section, we determined when a weakly semiprime ideal of a semiprime rings $R$ has an unbreakable-zero element while the final section contains some results about orthogonal of semigeneralized semiderivations of semiprime rings $R$. Also, we provided some examples to illustrate some cases required that. Following some results.

Theorem 1. Let $R$ be a 2-torsion free semiprime ring and $D$ is a semigeneralized semiderivation associated with a surjective $h$ of $R$ and the nonzero function $w$ associated with $d$ acts as a left multiplier of $R$. If $R$ admits to satisfying the identity $D(R)oD(R) = [R, R]$, then $R$ contains weakly semiprime ideal.

Theorem 2. Let $R$ be a semiprime ring, $U$ be an ideal of $R$ has $1 \neq 0$, and $D$ is a semigeneralized semiderivation associated with a surjective $h$ of $R$. If $R$ admits to satisfying $xRy = 0$, $x$ and $y$ some fixed elements of $R$ then

(i) $R$ contains weakly semiprime ideal.

(ii) Every weakly semiprime ideal has an unbreakable-zero element.

Keyword: Semigeneralized, Semiderivations, Semiprime Rings, Weakly Semiprime Ideal.

AMS 2010: Firstly(16W25), Secondly(16N60, 16U80).

References


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SOLITON SOLUTIONS OF WU-ZHANG SYSTEM BY GENERALIZED KUDRYASHOV METHOD

Seyma Tuluce Demiray ¹, Hasan Bulut ² and Ercan Celik ³

ABSTRACT. In this paper, generalized Kudryashov method (GKM) is used to find some exact solutions of Wu-Zhang system. Firstly, we get dark soliton solutions of this system by using GKM. Then, we plot graphics of all solutions of this system. Also, we remark results that we found by using this method.

Keyword: Wu-Zhang system, generalized Kudryashov method, dark soliton solution.
AMS 2010: 70K60,81Q05,35Q40,65N12.

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Gröbner-Shirshov Bases for Some Complex Reflection Groups
Eylem Güzel Karpuz 1, Nurten Urlu 2 and A. Sinan Çevik 3

Abstract. The Gröbner basis theory for commutative algebras was introduced by Buchberger [4] and provides a solution to the reduction problem for commutative algebras. Bergman generalized the Gröbner basis theory to associative algebras by proving the “Diamond Lemma”. On the other hand, the parallel theory of Gröbner bases was developed for Lie algebras by Shirshov [8]. In [1], Bokut noticed that Shirshov’s method works for also associative algebras. Hence, for this reason, Shirshov’s theory for Lie algebras and their universal enveloping algebras is called the Gröbner-Shirshov basis theory. The method of Gröbner-Shirshov basis which is the main theme of this work gives a new algorithm to get normal forms of elements of group structures, and so a new algorithm for solving the word problem [2, 5].

Shephard and Todd classified all finite complex reflection groups in [5]. A presentation for a finite complex reflection group G is not unique in general. Different presentations of G may reveal various different properties of G. Then it is worth to define a congruence relation among the presentations of G and then to ask that question “How many congruence classes of presentations are there for any irreducible finite complex reflection group G?” In [3], the authors solved this problem for the finite primitive complex reflection groups G = \{G_7, G_{11}, G_{15}, G_{19}, G_{27}\} and in [7], Shi studied the finite primitive complex reflection groups G = \{G_{12}, G_{24}, G_{25}, G_{26}\}. So by considering the presentations given in [3] and [7], our aim in this work is to find Gröbner-Shirshov bases and thus give solvability of the word problem of these important groups.

Keyword: Gröbner-Shirshov basis, complex reflection groups, presentation.
AMS 2010: 13P10, 20F05, 20F55.

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Some Applications of Vertex Algebras to Representation Theory of Infinite-Dimensional Lie Algebras

Gordan Radobolja

Abstract. We discuss representation theory of some infinite-dimensional Lie algebras of Virasoro type and accompanied vertex operator algebras. We present an interesting interplay between fusion rules for intertwining operators and irreducibility of certain tensor product modules on an example of twisted Heisenberg-Virasoro algebra at level zero. This is a joint work with D. Adamović.

AMS 2010: 17B68, 17B69.

References


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Non-Cancellation Group of a Direct Product of Groups under a Finite Group

Rugare Kwashira ¹, Jules Clement Mba ²

Abstract. Consider the semidirect product $G_i = Z_{n_i} \omega_i Z$. Methods for computation of the non-cancellation groups $\chi(G_1 \times G_2)$ and $\chi(G_k^h)$, $k \in N$ were developed in [9] and in [1] respectively. We develop a general method of computing $\chi(G_1 \times G_2, h)$, where $h : F \to G_1 \times G_2$ and $F$ a finite group.

Keyword: Non-cancellation set, Direct product, Semidirect product.

References


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Some Arithmetical Properties of $q$-Fibonacci Numbers

Mehmet Cenkci

Abstract. We consider some arithmetical properties of $q$-Fibonacci numbers, which give finite versions of the Rogers-Ramanujan identities obtained by Schur. We also obtain some divisibility properties for a generalization of $q$-Fibonacci numbers. This work was supported by Research Fund of the Akdeniz University. Project Number: FBA-2018-3647.

Keyword: $q$-Fibonacci numbers, Rogers-Ramanujan identities, congruences.

AMS 2010: 11B39, 11P84.

References


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A Note on the Infinite Dimensional Grassmann Algebra

Nazan AKDOĞAN

Abstract. In this work we consider infinite dimensional Grassmann algebra generated by countable set \( \{ e_1, e_2, \ldots \} \). The automorphisms of finitely generated Grassmann algebra are completely determined. We investigate automorphisms in order to describe automorphism group of infinite dimensional Grassmann algebra.

Keyword: Grassmann algebra, automorphism.

AMS 2010: 15A75, 14J50.

References

Matrix Representations of Some Bicomplex Numbers

Serpil Halici ¹, Sule Curuk ²

Abstract. In this work, considering bicomplex numbers whose coefficients from the Fibonacci sequence we examined the matrix representations of these numbers. Using matrices we give some properties involving these numbers. Then, we compute the eigenvalues and eigenvectors of this special matrix.

Keyword: Recurrences, Fibonacci sequences, Bicomplex numbers, Matrices.

AMS 2010: Primary 11B37; Secondary 11B39, 11B83, 15A60.

References


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ON SOME BICOMPLEX POLYNOMIALS
Serpil Halici 1, Sevim Aslan 2

ABSTRACT. In this study, we introduce bicomplex polynomials with Fibonacci coefficients. With the help of idempotent bases of bicomplex numbers we have studied the roots of bicomplex polynomials and classify these roots.

Keyword: Recurrences, Fibonacci sequences, Bicomplex numbers.
AMS 2010: 11B37, 11B39, 11B83.

REFERENCES
ON BICOMPLEX JACOBSTHAL NUMBERS AND THEIR IDEMPOTENT REPRESENTATIONS

Serpil Halici ¹

ABSTRACT. In this study, we defined a new sequence of bicomplex numbers with coefficients from the Jacobsthal sequence. We study some fundamental properties of this new sequence using the idempotent representation of bicomplex numbers. We give three important identities that relate recurrence relations to matrix theory. Moreover, we obtain some identities for these numbers.

Keyword: Recurrences, Jacobsthal sequence, Bicomplex numbers.

AMS 2010: 11B37, 11B39, 11B83.

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A Note on Vector-Valued Modular Forms on Finite Upper Half Planes

Yoshinori Hamahata

Abstract. Let \( \mathcal{H} = \{ z \in \mathbb{C} \mid \text{Im}(z) > 0 \} \) be the Poincaré upper half plane, and let \( \rho : SL(2, \mathbb{Z}) \to GL(n, \mathbb{C}) \) be an \( n \)-dimensional complex representation. A holomorphic map \( F : \mathcal{H} \to \mathbb{C}^n \) is called a vector-valued modular form of weight \( w \) (\( w \) any real number) and \( \rho \) if for any \( \left( \begin{array}{cc} a & b \\ c & d \end{array} \right) \in SL(2, \mathbb{Z}) \), we have
\[
F \left( \frac{az + b}{cz + d} \right) = (cz + d)^w \rho \left( \begin{array}{cc} a & b \\ c & d \end{array} \right) F(z),
\]
and if a cuspidal condition holds [2, 6, 7]. The classical vector-valued modular forms have been investigated as a generalization of scalar-valued modular forms.

In the mid-1980s, A. Terras introduced a finite upper half plane \( \mathcal{H}_q \) that is defined over a finite field \( \mathbb{F}_q \) as an analog of \( \mathcal{H} \). Specifically, she and her coworkers investigated scalar-valued modular forms on \( \mathcal{H}_q \) in [1, 3, 8, 9]. In [4], modular forms of a new type were studied on \( \mathcal{H}_q \). In [5], vector-valued modular forms were introduced and studied on \( \mathcal{H}_q \). The purpose of this presentation is to report that some vector-valued modular forms are constructed and that the dimension of the space of vector-valued modular forms for \( GL(2, \mathbb{F}_q) \) is computed.

Keyword: vector-valued modular form, finite upper half plane.

AMS 2010: Firstly 11T60, Secondly 11F11.

References


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Widths and Entropy of Multiplier Operators on Compact Homogeneous Manifolds

A. Kushpel ¹, J. Levesley ² and K. Taş ³

Abstract. We develop a general method to calculate entropy and \( n \)-widths of multiplier operators (in particular standard Sobolev’s classes) on an arbitrary compact homogeneous Riemannian manifold \( \mathbb{M}^d \). Our method is essentially based on a detailed study of geometric characteristics of norms induced by subspaces of harmonics on \( \mathbb{M}^d \). This approach has been developed in the cycle of works [1-8]. The method’s possibilities are not confined to the statements proved but can be applied in studying more general problems. As an application, we establish sharp orders of entropy and \( n \)-widths of multiplier operators \( \Lambda : L_p \to L_q \) for any \( 1 < p, q < \infty \). In the case \( p, q = 1, \infty \) sharp in the power scale estimates are presented.

Keyword: Entropy, \( n \)-widths, compact homogeneous manifold, Lévy mean, volume.
AMS 2010: 41A46, 42B15.

References


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ON THE FEKETE-SZEGÖ INEQUALITY FOR A NEW SUBCLASS OF M-FOLD SYMMETRIC FUNCTIONS EQUIPPED WITH SUBORDINATION

Arzu Akgul

ABSTRACT. Subordination is an important concept in the area of complex function theory. There has been some work in this area for the past three decades. In this article, we provide an Fekete-Szegő estimate with m-fold symmetric functions for certain classes of analytic bi-univalent functions using subordination. Also we connect our consequences with well known studies.

Keyword: Analytic function, bi-univalent, Fekete-Szegő estimate.

AMS 2010: 30C45.

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Krasnoselskii's Fixed Point Theorem for Multivalued Operators

Cesim TEMEL¹

Abstract. In this study, we aim to establish Krasnoselskii's fixed point theorem for multivalued operators with the generalized $D$-Lipschitzian acting in Banach spaces. In particular, the existence of fixed points of multivalued operator $P + Q$ is discussed, where $P$ is based on the generalized $D$-Lipschitzian and $Q$ is a completely continuous multivalued operator.

Keywords: Fixed point theorem, Krasnoselskii’s fixed point theorem, completely continuous operator, multivalued operator.

AMS 2010: 34K13, 47H04, 47H10.

References


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A BANACH ALGEBRA AND ITS RELATED FEYNMAN INTEGRALS
Dong Hyun Cho

ABSTRACT. Let $C[0,T]$ denote the space of continuous, real-valued functions on $[0,T]$. In this talk, we introduce two Banach algebras $M'' \equiv M''(\sum \Delta_n \times \mathbb{R}^n)$ and $\bar{S}_{\alpha,\beta,\varphi}'' \equiv S_{\alpha,\beta,\varphi}''(\sum \Delta_n \times \mathbb{R}^n)$: $S_{\alpha,\beta,\varphi}''$ is defined over paths in $C[0,T]$ and $M''$ is a space of sequences of measures finite variation on $\sum \Delta_n \times \mathbb{R}^n$. We also establish an isomorphism between $M''$ and $\bar{S}_{\alpha,\beta,\varphi}''$, and prove that $S_{\alpha,\beta,\varphi}''$ is embedded in $\bar{S}_{\alpha,\beta,\varphi}''$. As an application, we derive analytic Feynman integrals of the functions in $\bar{S}_{\alpha,\beta,\varphi}''$ which play significant roles in Feynman integration theories and quantum mechanics. In particular, if $\alpha(t) =, \beta(t) = t$ for $t \in [0,T]$, and $\varphi = \delta_0$ which is the Dirac measure concentrated at 0, then $\bar{S}_{\alpha,\beta,\varphi}''$ is reduced to $S''$ which is introduced by Cameron and Storvick [2].


AMS 2010: 46J10, 60H05.

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Abstract. There is a considerable literature concerning the relationship between L-weakly and M-weakly compact operators, which are subclasses of weakly compact operators, with weakly compact operators and other classes. However there is no any discussion on the order structure of these operator spaces. For many special classes of operators between Banach lattices, e.g., compact operators, weakly compact operators, or Dunford-Pettis operators, the so-called domination problem is both important and non-trivial. By way of contrast, no extra conditions are needed when we deal with L-weakly or M-weakly compact operators. Despite this fact it can be seen from some examples given by Chen and Wickstead that L-weakly and M-weakly compact (also regular ones) operators are not form of a Riesz space. For this reason, we should be working smaller spaces $W^L_r(E,F)$ and $W^M_r(E,F)$ which are generated by positive L-weakly and M-weakly compact operators, respectively.

Some results on the order structure of these operator classes were given. As a continuation, natural questions to ask are: When are our spaces band in regular operators? When is the norm in a Banach lattice of operators KB-norms? In this study partial answers to these questions are provided.

Keyword: L-weakly compact operator, M-weakly compact operator, Band, Banach lattice, KB-space.

AMS 2010: 46B42, 47B60, 47B65

References


1Tekirdag Namik Kemal University, Tekirdag, Turkey, ebayram@nku.edu.tr
Abstract. In this presentation, we establish some geometric properties of a new sequence space derived by using Euler’s totient function.

Keyword: Sequence spaces, geometric properties, Euler totient function, Möbius function.

AMS 46B45, 46A45, 46B20, 46B45.

References

Infinite Systems of Differential Equations in Banach Spaces Constructed by Fibonacci Numbers

Emrah Evren Kara 1 and Merve İlkhan 2

Abstract. The aim of this presentation is to establish sufficient conditions for the solvability of infinite systems of ordinary differential equations in infinite-dimensional Banach sequence spaces $c_0(\hat{F})$ and $\ell_p(\hat{F})$. We apply the technique of measures of non-compactness to the theory of infinite system of differential equations in these Banach spaces.

Keyword: Differential equations, Fibonacci numbers, Banach spaces, Hausdorff measure of noncompactness.

AMS 2010: 34A34, 11B39, 34G20.

References


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Some Integral Inequalities for Generalized Fractional Integral Operators

Fuat Usta 1, Hüseyin Budak 2 and Mehmet Zeki Sarıkaya 3

Abstract. In this presentation, we first obtain some generalized Montgomery identities for generalized fractional integral operator. Then, using these Montgomery identities, we establish some Ostrowski type inequalities for function whose derivatives are bounded. We further obtain generalized inequalities for mappings whose absolute value of derivatives are convex.

Keyword: Montgomery identity, Ostrowski inequality, fractional integral, convex function.


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GENERALIZED LACUNARY STATISTICAL BOUNDEDNESS IN SEQUENCES OF FUZZY NUMBERS

Hifsi ALTMOK 1, Mikail ET 2, Yavuz ALTIN 3

ABSTRACT. In this study we generalize the study of Et et al [5] for sequences of fuzzy numbers and so define the sequence class $S^0_\beta (F,b)$. Furthermore, we give some inclusion theorems relation to statistical boundedness and lacunary statistical boundedness, and examine the some properties like symmetricity, normality and monotonicity.

Keyword: Sequence of fuzzy numbers, statistical boundedness, lacunary sequence.

AMS 2010: 40A05, 40A25, 40A30, 40C05, 03E72.

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Generalized Statistical Convergence Defined by a Modulus Function

Hıfsı ALTINOK ¹, Derya DENİZ ²

ABSTRACT. In this study, we define the sequence classes $S^\beta (\Delta^m, F, f)$, $w^\beta (\Delta^m, F, f)$ and $w^{\beta, \infty} (\Delta^m, F, f)$ for a positive real number $\beta$ in sequences of fuzzy numbers, where $\Delta^m$ is a generalized difference operator and $f$ is a modulus function, and examine some topological properties related to these sequence classes.

Keyword: Difference sequence, fuzzy sequence, statistical convergence, modulus function.

AMS 2010: 03E72, 40C05, 40A30.

REFERENCES


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A SUBCLASS OF HARMONIC UNIVALENT FUNCTIONS DEFINED BY A LINEAR OPERATOR

Hasan Bayram \(^1\) and Sibel Yalcın \(^2\)

ABSTRACT. In the present paper, we investigate some basic properties of a subclass of harmonic functions defined by multiplier transformations. Such as, coefficient inequalities, distortion bounds and extreme points.

Keyword: Harmonic, univalent, modified generalized Salagean operator, multiplier transformation.

AMS 2010: 30C45, 30C50.

REFERENCES


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ON A NEW SUBCLASS OF HARMONIC UNIVALENT FUNCTIONS DEFINED BY A LINEAR OPERATOR

Hasan Bayram ¹ and Sibel Yalçın ²

ABSTRACT. In the acquaint article, we discovered and scrutinize some fundamental attribute of a subclass of harmonic univalent functions defined by a new multiplier Transformation. Such as, coefficient inequalities, distortion bounds and extreme points.

Keyword: Harmonic, univalent, a new linear operator, multiplier transformation.

AMS 2010: 30C45, 30C50.

REFERENCES


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ON A NEW SUBCLASS OF GOODMAN-RONNING TYPE HARMONIC UNIVALENT FUNCTIONS DEFINED BY SUBORDINATION

Hasan Bayram ¹ and Sibel Yalcın ²

ABSTRACT. In this article, we introduced and defined a new subclass of harmonic functions which by use of a subordination. We determine necessary and sufficient conditions, distortion bounds, radii of starlikeness and convexity, compactness and extreme points for the class of harmonic functions we have defined.

Keyword: Harmonic, univalent, Subordination, multiplier transformation.

AMS 2010: 30C45, 30C80.

REFERENCES


¹Uludag University, Bursa, Turkey, hbayram@uludag.edu.tr
²Uludag University, Bursa, Turkey, syalcin@uludag.edu.tr
Abstract. In this paper the sequence spaces $b_{0}^{r,s}(p)$, $b_{c}^{r,s}(p)$, $b_{\infty}^{r,s}(p)$ and $b^{r,s}(p)$ which are the generalization of the classical Maddox’s paranormed sequence spaces have been introduced and proved that the spaces $b_{0}^{r,s}(p)$, $b_{c}^{r,s}(p)$, $b_{\infty}^{r,s}(p)$ and $b^{r,s}(p)$ are linearly isomorphic to spaces $c_{0}(p)$, $c(p)$, $\ell_{\infty}(p)$ and $\ell(p)$, respectively. Besides this, the $\alpha$−, $\beta$− and $\gamma$−duals of the spaces $b_{0}^{r,s}(p)$, $b_{c}^{r,s}(p)$, $b_{\infty}^{r,s}(p)$ and $b^{r,s}(p)$ have been computed, their bases have been constructed and some topological properties of these spaces have been studied. Finally, the classes of matrices $(b_{0}^{r,s}(p) : \mu)$ has been characterized, where $\mu$ is one of the sequence spaces $\ell_{\infty}$, $c$ and $c_{0}$ and derives the other characterizations for the special cases of $\mu$.

Keyword: Paranormed sequence spaces, Binomial sequence spaces, Matrix domain, Matrix transformations.

AMS 2010: 46A45, 40C05, 40A05.

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Approximation of B-Continuous and B-Differentiable Functions by GBS Operators

H. Güll İnce İıarslan ¹, Ayşegül Erençın ², Gülen Başcanbaz Tunca ³

Abstract. In [8] and [9] Bögel introduced the concept of B-continuous and B-differentiable functions. In [10], the important theorems of the real functions in one variable are improved using the concepts of B-continuity and B-differentiability. The Korovkin-type theorem for approximation of B-continuous functions using the generalized boolean sum (GBS) operators is given by Badea et al. [1]. A very well known Shisha-Mond theorem [17] for B-continuous functions is given by Badea et al. [2]. Very recently, several researchers studied the GBS operators of the many bivariate operators [3-7 and 11-14]. In this study, we gave the approximation properties of the GBS operators of the bivariate modified gamma operators.

Keyword: Bögel-continuity, Bögel differentiability, GBS operators.


References


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LACUNARY STATISTICAL CONVERGENCE OF GENERALIZED DIFFERENCE SEQUENCES

Hatice Gidemen 1, Mikail Et 2

ABSTRACT. In this study using the difference operator $\Delta^m$ and an unbounded modulus function, we generalize the concept of $f-$lacunary statistical convergence and lacunary strongly convergence with respect to a modulus $f$. It is shown that, under some conditions on a modulus $f$, the concept of lacunary strongly convergence with respect to a modulus $f$ and $f-$lacunary statistical convergence are equivalent for $\Delta^m-$bounded sequences.

AMS 2010: 40A05, 40C05, 46A45.

REFERENCES


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Common Best Proximity Points in Elliptic Valued b-Metric Spaces
Mahpeyker Ozturk ¹, Isil Arda Kosal ² and Hidayet Huda Kosal ³

Abstract. In this study, we introduce the concept of common best proximity points for non-self mappings between two subsets of elliptic valued b-metric spaces. For this purpose, first we generalize some well-known results that were proved in complex metric spaces on elliptic valued b-metric space by some new definitions. Second we present a type of contractive condition and develop a common best proximity point theorem for non-self mappings in elliptic-valued b-metric spaces. Also, our results are illustrated with example. Elliptic numbers are generalized form of complex and so real numbers. Thus, the obtained results extend, generalize and complement some known fixed and best proximity point results from the literature.

Keyword: Common Best Proximity, Elliptic Numbers Valued Metric Spaces

References

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A NEW APPLICATION OF ABSOLUTE MATRIX SUMMABILITY OF INFINITE SERIES

Hikmet Seyhan Özarslan ¹, Ahmet Karakaş ²

ABSTRACT. In this study, we establish a general theorem concerning absolute matrix summability of infinite series by using almost increasing sequences. Finally, we give some results about absolute summability.

Keyword: Summability factors, absolute matrix summability, almost increasing sequence, infinite series, Hölder inequality, Minkowski inequality.

AMS 2010: 26D15, 40D15, 40F05, 40G99.

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A NEW THEOREM ON BOUNDEDNESS AND ABSOLUTE SUMMABILITY

Hikmet Seyhan Özarslan ¹, Bağdagül Kartal ²

ABSTRACT. In this paper, a general theorem dealing with boundedness and \(|A, p_n|_k\) summability factors of infinite series has been established, where \(A\) is a positive normal matrix. This new theorem also reveals some results.

Keyword: Absolute matrix summability, infinite series, Riesz mean, summability factor. 
AMS 2010: 40D15, 40F05, 40G99.

REFERENCES


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Fixed Point Results in Cone Banach Spaces

Isa Yildirim\(^1\), Faruk Develi\(^2\)

**Abstract.** In this work, we give some fixed point results without the restriction conditions \(2 \leq q < 4\) and \(2 \leq r < 5\) at the Theorems 2.4 and 2.6 in [4]. Also, some contraction principle of cone Banach Space are stated and proved with the help of \(\Phi_p\) operator. The results of this work improve and extend very results in the literature.

Keyword: Fixed point, cone Banach space, \(\Phi_p\) operator.

AMS 2010: 54H10, 54H25.

**References**


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Weighted Composition Operators That Preserve Frames

Jasbir Singh Manhas¹, Gabriel T. Prajitura², Ruhan Zhao³

Abstract. We characterize weighted composition operators that preserve frames, tight frames, or normalized tight frames in the general weighted Hilbert Bergman spaces on the unit ball of \( \mathbb{C}^n \).

Keyword: Hardy spaces, weighted Bergman spaces, frames.

AMS 2010: 47B33, 32A36.

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THE IDEAL STRUCTURE OF LATTICE-ORDERED GROUPS AND THEIR CROSSED PRODUCTS

Mamoon Ahmed

ABSTRACT. Let \((G, G_+\)) be a lattice-ordered group with positive cone \(G_+\) and \(H_+\) a hereditary subsemigroup of \(G_+\). In [2] we showed that the ideal \(I_{H_+} \times_\alpha G_+\) is a closed ideal of the \(C^*-\)subalgebra \(B_{G_+}\) of \(\ell^\infty(G_+)\) spanned by the functions \(\{1_x : x \in G_+\}\) and is therefore contained in the commutator ideal \(C_G\) of the \(C^*-\)-algebra \(B_{G_+} \times_\alpha G_+\). Adji and Raeburn shown in [1, Theorem 3.1] a result about the structure of the primitive ideal space of the \(C^*-\)-algebra \(B_{G_+} \times_\alpha G_+\) for a totally ordered abelian group. In this paper we show that if \(\sum(G)\) is the set of subgroups \(H := H_+ - H_+\) partially ordered by inclusion, then there exists a well-defined map \(F\) from the disjoint union \(\bigsqcup \{\hat{H} : H \in \sum(G)\}\) to the primitive ideals of the Toeplitz algebra \(B_{G_+} \times_\alpha G_+\). This allows us to deduce information about the irreducible representations of the \(C^*-\)-crossed product \(B_{G_+} \times_\alpha G_+\). Key word: Lattice-ordered group, \(C^*-\)-algebra, crossed product, short exact sequence, primitive ideal, irreducible representation.

REFERENCES


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ON $f-$LACUNARY STATISTICAL CONVERGENCE OF ORDER $\alpha$ OF SEQUENCES OF SETS

Mikail Et 1, Mehmet Arslanoglu 2

ABSTRACT. The idea of statistical convergence was given by Zygmund [15] in the first edition of his monograph published in Warsaw in 1935. The concept of statistical convergence was introduced by Steinhaus [14] and Fast [7] and later reintroduced by Schoenberg [12] independently. Later on it was further investigated from the sequence space point of view and linked with summability theory by Bhardwaj et al. [2−4], Çolak [5], Et et al. [6, 13], Fridy [9], Salat [11] and many others. In this study we introduce and examine the concepts of $f-$Wijsman lacunary statistical convergence of order $\alpha$ and $f-$Wijsman strong $p-$lacunary convergence of order $\alpha$ for set sequences. Also, we give some relations connected to these concepts.

Keyword: Density, statistical convergence, modulus function.

AMS 2010: 40A05, 40C05, 46A45.

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A Confined Newton-Type Method for Nonsmooth Generalized Equations with Metrically Regular Mappings

M. H. Rashid ¹, Ya-Xiang Yuan ²

Abstract. Notion of metric regularity property is used for solving nonsmooth generalized equation \( f(x) + F(x) \ni 0 \), where \( X \) and \( Y \) are Banach spaces, and \( U \) is an open subset of \( X \), \( f : U \to Y \) is nonsmooth function and \( F : X \to 2^Y \) is a set-valued mapping with closed graph. When \( f \) admits point-based and \( p \)-point-based approximations on \( U \) and \( f + F \) satisfies metric regularity property, we introduce a confined Newton-type method for solving the above nonsmooth generalized equation and establish the semilocal quadratic and super-linear convergence as well as local quadratic and super-linear convergence of sequences generated by the confined Newton-type method. In particular, the results obtained in this paper extend the corresponding ones in [2].

Keyword: Set-valued mappings, Generalized equations, Metrically regular mapping, Semilocal convergence, Point based-approximations.


References


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ON SOFT HILBERT SPACES

Murat Ibrahim Yazar ¹, Çigdem Gunduz Aras ², Sadi Bayramov ³

Abstract. Molodtsov [1] introduced the notion of soft set which can be considered as a new mathematical approach for vagueness. Das and Samanta [2] first defined the soft vector space and soft norm. Yazar and et al. [3] defined the soft vector space by using the concept of soft point given in [4, 5] and introduced the soft normed spaces in a new point of view. In the present paper, we give some properties of soft inner product spaces and present some examples for soft inner product spaces. Soft Hilbert space is introduced and some related properties are investigated. Finally, soft ℓ₂ space is given as an example for soft Hilbert spaces.

Keyword: soft sets, soft inner product spaces, soft Hilbert spaces

AMS 2010: 46A22, 46B99

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Hermite-Hadamard Inequalities Involving the Gauss Hypergeometric Function

Mehmet Zeki Sarikaya

Abstract. The goal of this study is obtained the new generalization Hermite-Hadamard-Fejer inequalities involving the Gauss hypergeometric function. The results presented here would provide some fractional inequalities involving Saigo, Erdelyi-Kober and Riemann-Liouville type fractional operators.

Keyword: Convex function, Hermite-Hadamard inequality, Gauss hypergeometric function.
AMS 2010: 26A09; 26A33; 26D10; 26D15; 33E20.

References


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Some Weighted Generalization of Hermite-Hadamard Inequalities for Double Integrals

Mehmet Zeki Sarikaya 1, and Hüseyin Budak 2

Abstract. In this study, we obtain some weighted double integral inequalities of Hermite-Hadamard type for co-ordinated convex functions in a rectangle from the plane \(\mathbb{R}^2\). The inequalities established in this study provide generalizations of some result given in earlier works.

Hermite-Hadamard-Fejer inequalities, co-ordinated convex, integral inequalities.


References


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Approximation by Bivariate Lupas and Szasz-Brenke Type Operators

Nurhayat Ispir

Abstract. In this study, a combination of Lupas operators and generalized Szasz operators based on Brenke polynomials is introduced. The order of approximation of these bivariate operators are investigated using the partial and complete modulus of continuity. Results related to Lipschitz classes are given. A better order of approximation is obtained for these operators than bivariate Lupas and Szasz-Brenke operators.

Keywod:Lupas operators, Szasz operators,Brenke polynomials, order of approximation.


References


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Investigation of the Spectrum and the Jost Solutions of Sturm-Liouville Problems

Nihal Yokus, Nimet Coskun

Abstract. Spectral analysis of differential operators have many application areas in science like quantum mechanics, mathematical physics, economics and engineering. Spectral theory of Sturm-Liouville equation was begun by Naimark [1]. He showed that spectrum of this operator consists of eigenvalues, spectral singularities and continuous spectrum. Also, these spectral singularities and eigenvalues are of finite number under certain conditions. In this study, we shall present necessary and sufficient conditions for the finiteness of the eigenvalues and spectral singularities of Sturm-Liouville equation consisting of eigenparameter dependent boundary condition [2,3].

Keyword: Spectral analysis, Sturm-Liouville equation, spectral singularities.

AMS 2010: 34B08, 34B09, 34B24.

References

AN EIGENFUNCTION EXPANSION OF THE NON-SELFADJOINT STURM-LIOUVILLE OPERATOR

Nihal Yokus 1, Esra Kir Arpat 2 and Nimet Coskun 3

Abstract. We consider the operator $L$ generated in $L_2(\mathbb{R}^+)$ by the differential expression $l(y) = -y'' + q(x)y, x \in \mathbb{R}^+ := [0, \infty)$ and the boundary condition $y'(0) = (\alpha_0 + \alpha_1 \lambda + \alpha_2 \lambda^2) y(0)$. We proved that spectral expansion of $L$ in terms of the principal functions under the condition $q \in AC(\mathbb{R}^+), \lim_{x \to \infty} q(x) = 0, \sup_{x \in \mathbb{R}^+} [e^{\varepsilon \sqrt{x}}|q'(x)|] < \infty, \varepsilon > 0$ taking into account the spectral singularities. We have also proved the convergence of the spectral expansion.

Keyword: Eigenvalues, spectral singularities, principal functions, resolvent, spectral expansion.

AMS 2010: 47E05, 34B05, 34L05, 47A10.

REFERENCES


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Note on Atomic Decompositions for Harmonic Bergman-Besov Spaces with Small Exponents

Ömer Faruk Dogan

Abstract. We study harmonic Bergman-Besov spaces $b^p_\alpha$ on the unit ball of $\mathbb{R}^n$, where $0 < p < 1$ and $\alpha \in \mathbb{R}$. We provide atomic decomposition based on reproducing kernels for all $b^p_\alpha$ when $0 < p < 1$ and $\alpha \in \mathbb{R}$. Our other result is about growth at the boundary.

Keyword: Harmonic Bergman-Besov space, Boundary growth, Atomic decomposition.


References


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ON THE BOUNDEDNESS OF A CLASS OF INTEGRAL OPERATORS ON THE UNIT BALL

Ömer Faruk Dogan

ABSTRACT. For $a, b, c, \alpha \in \mathbb{R}$, we determine exactly when the integral operator

$$T_{a,b,c} \varphi(x) = (1 - |x|^2)^a \int_{\mathbb{B}} R_c(x, y) \varphi(y)(1 - |y|^2)^b d\nu(y)$$

related to harmonic Bergman-Besov projection is bounded on $L^p(\mathbb{B}, d\nu_\alpha)$, where $\mathbb{B}$ is the open unit ball in $\mathbb{R}^n$, $1 \leq p < \infty$, $d\nu_\alpha(x) = (1 - |x|^2)^\alpha d\nu(x)$ with $d\nu$ being volume measure on $\mathbb{B}$, and $R_c(x, y)$ is the reproducing kernel for harmonic Bergman-Besov spaces. The characterization remains the same if we replace the reproducing kernel above by its modulus $|R_c(x, y)|$.

Keyword: Integral operators, Sufficient condition, Necessary condition.


REFERENCES


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Abstract. In this study, we define new paranormed sequence spaces by using sequences of Lucas numbers. Furthermore, we compute the $\alpha-$, $\beta-$ and $\gamma-$duals and obtain basis for these sequence spaces. Besides this, we characterize the matrix transformations from the new paranormed sequence spaces to the spaces $c_0(q), c(q), \ell_\infty(q)$ and $\ell(q)$. Finally, Lucas core of a complex-valued sequence has been introduced, and we prove some inclusion theorems related to this new type of core.

Keyword: Paranormed sequence spaces, Lucas numbers, Core theorems.

AMS 2010: 46A45, 40C05, 40A05.

References


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ON THE NEW DIFFERENCE SEQUENCE SPACE

Sezer Erdem \(^1\) and Serkan Demiriz \(^2\)

ABSTRACT. The purpose of the this study is to introduce the sequence space

\[ \ell_p(B(r, s), E) = \left\{ x = (x_n) \in \omega : \sum_{n=1}^{\infty} \left| r_n x_{\min E_n} + s_n x_{\min E_{n+1}} \right|^p < \infty \right\}, \]

where \( E = (E_n) \) is a partition of finite subsets of the positive integers, \( r, s \in \mathbb{R}\setminus\{0\} \) and \( p \geq 1 \). The topological and algebrical properties of this space are examined. Furthermore, some inclusion relations are given. Finally, the problem of finding the norm of certain matrix operators such as Copson and Hilbert from \( \ell_p \) into \( \ell_p(B(r, s), E) \) is investigated.

Keyword: Difference sequence space, Matrix domains, Copson matrix, Hilbert matrix.
AMS 2010: 46A45, 46B20, 40C05, 40G05.

REFERENCES


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The Norm of Certain Matrix Operators on the New Block Sequence Space

Sezer Erdem \(^1\) and Serkan Demiriz \(^2\)

Abstract. The purpose of this study is to introduce the sequence space

\[
\ell_p(E, B(r, s)) = \left\{ x = (x_n) \in \omega : \sum_{n=1}^{\infty} \left( \sum_{j \in E_n} r x_j + \sum_{j \in E_{n+1}} s x_j \right)^p < \infty \right\},
\]

where \(E = (E_n)\) is a partition of finite subsets of the positive integers, \(r, s \in \mathbb{R} \setminus \{0\}\) and \(p \geq 1\). The topological and algebraic properties of this space are examined. Furthermore, we establish some inclusion relations. Finally, the problem of finding the norm of certain matrix operators such as Copson and Hilbert from \(\ell_p\) into \(\ell_p(E, B(r, s))\) is investigated.

Keyword: Block sequence space, Matrix domains, Copson matrix, Hilbert matrix.
AMS 2010: 46A45, 46B20, 40C05, 40G05.

References


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Approximation Properties of the Generalized Szasz-Mirakyan Operator of Max-Product Kind

Sevilay Kirci Serenbay

Abstract. In the classical approximation theory the approximating polynomials are exclusively linear operators. In the recent years Bede et. al. [2] defined nonlinear operators which are formed by using maximum (V) and product (.) operations. They studied the approximation properties of these new operators and showed that they have similar properties as the ones obtained by classical approximation process. In the light of these studies, in this paper we introduce a new operator of max product kind. We present the generalized Szasz-Mirakyan operator of max-product kind and we give an estimate for the error of approximation using modulus of continuity.

Keyword: Max product kind, Approximation, Szasz-Mirakyan operator.

AMS 2010: 41A25, 41A30

References


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Abstract. There is a principal moment in the theory of pseudo-differential equations, it is a studying model or local equation in a special so-called canonical domain. The type of a canonical domain is defined by a placement of a localization point on a manifold under consideration. Indeed, there are a lot of canonical domains on a manifold, and to obtain a Fredholm property for starting pseudo-differential operator one needs to study a local situation every time.

If a manifold has a boundary there are a lot of obstacles because the kernel or co-kernel of a local operator can be infinite-dimensional, and more complicated situation is that when a boundary has certain singularities. For the latter case one needs to add some supplementary conditions as a rule these are boundary conditions to obtain certain local boundary value problem.

We consider a certain integro-differential operator $A$ on $m$-dimensional compact manifold $M$ with a boundary. This operators is defined by the function $A(x, \xi), (x, \xi) \in \mathbb{R}^{2m}$. There are some smooth compact sub-manifolds $M_k$ of dimension $0 \leq k \leq m - 1$ on the boundary $\partial M$ of manifold $M$ which are singularities of a boundary. These singularities are described by a local representative of operator $A$ in a point $x_0 \in M$ on the map $U \ni x_0$ in the following way

$$(A_{x_0} u)(x) = \int_{D_{x_0}} \int e^{i\xi \cdot (x-y)} A(\phi(x_0), \xi) u(y) d\xi dy, \ x \in D_{x_0},$$

where $\phi : U \to D_{x_0}$ is a diffeomorphism, and the canonical domain $D_{x_0}$ has a distinct form depending on a placement of the point $x_0$ on manifold $M$. We consider following canonical domains $D_{x_0}$: $\mathbb{R}^m, \mathbb{R}_+^m = \{x \in \mathbb{R}^m : x = (x', x_m), x_m > 0\}, W^k = \mathbb{R}^k \times C^{m-k}$, where $C^{m-k}$ is a sharp convex cone in $\mathbb{R}^{m-k}$.

Such an operator $A$ will be considered in Sobolev-Slobodetskii spaces $H^s(M)$, and local variants of such spaces will be spaces $H^s(D_{x_0})$.

The book [1] is devoted to describing such studies for local operators (boundary value problems), and now we have some multi-dimensional advances [2-4].

AMS 2010: 35S15, 47G30.
REFERENCES


Abstract. In this study, using the generalized difference operator $\Delta^m$ and a sequence $\lambda = (\lambda_n)$ is a non-decreasing sequence of positive numbers tending to $\infty$ such that $\lambda_{n+1} \leq \lambda_n + 1$, $\lambda_1 = 1$, we generalize the concepts of statistical convergence of order $\alpha$ and $p$–Cesàro summability of order $\alpha$ and give some relations connected to these concepts.

Keyword: Statistical convergence, $\lambda$–statistical convergence, Cesàro summability, Difference sequences.
AMS 2010: 40A05, 40C05, 46A45.

References


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APPLIED MATHEMATICS
ABSTRACT. A variety of mathematical models are used to detect losses from many epidemic diseases seen in the world and in Turkey. Some of these are SI, SIS, SIR, MSIRS, ... etc. In this study, we have estimated the future increase or decrease of some epidemic diseases such as Tuberculosis, CCHF, Malaria, Measles, etc. by using SI, SIS and SIR models. As a result, we are thinking that this study will shed light on countries and societies in terms of disease progression and regression.

Keyword: Epidemic, Diseases, Models.

REFERENCES


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ON A MULTIVARIATE CONDITIONAL VALUE AT RISK VIA COPULA
Andres Mauricio Molina Barreto ¹, Naoyuki Ishimura ² and Yasukazu Yoshizawa ³

ABSTRACT. Let $X$ be a random variable and denote by $F_X(x) = P(X \leq x)$ the distribution function. The Value at Risk (VaR) for $0 < \beta \leq 1$ is defined by

$$\text{VaR}_\beta(X) := F_X^{(-1)}(\beta) = \inf\{t \mid F_X(t) \geq \beta\},$$

and the conditional Value at Risk (CVaR) is defined by

$$\text{CVaR}_\beta(X) := \frac{1}{\beta} \int_0^\beta F_X^{(-1)}(t)dt.$$ 

It is well recognized that VaR gives a standard benchmark of measures of risk. See [1] for instance.

In this presentation, we consider a multivariate extension of VaR; to be more specific, we are concerned with VaR for random vector $X$.

However, the generalization of VaR to multivariate case seems not so obvious. Indeed, despite its importance, there is little attempt in the literature. Observe an exception of elaborate work of [2].

We here deal with a copula-bases conditional Value at Risk (CVaR($X$)), which is recently introduced by A. Krzemienowski and S. Szymczyk [3]. Since a copula function is known to provide a flexible tool for analyzing a nonlinear dependence relation between random events, it is expected that CVaR($X$) serves as a possible measure of risk for random vectors under nonlinear relations.

Our aim is to show some analytical properties of CVaR($X$) as well as to compute several examples. Applications to real data will also be exhibited.

Keyword: multivariate conditional Value at Risk, copula, measure of risk.
AMS 2010: 60E05, 91B30.

REFERENCES


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A LOGARITHMIC FINITE DIFFERENCE TECHNIQUE FOR NUMERICAL SOLUTION OF THE GENERALIZED HUXLEY EQUATION

Bilge Inan 1

ABSTRACT. In this work, we describe an explicit logarithmic finite difference method to approximate the solution of the nonlinear generalized Huxley equation. The obtained numerical solutions are compared with the exact solutions and other results already available in the literature to illustrate the accuracy and reliability of the method. As a result of these comparisons, it is concluded that the method is reliable and convenient alternative method for solving the generalized Huxley equation.

Keyword: The generalized Huxley equation, finite difference method, logarithmic finite difference method.


REFERENCES


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Abstract. In this study, the effect of various boundary conditions on the critical parameters in the 3D buckling delamination problem around the interface band crack contained in PZT/Metal/PZT sandwich rectangular thick plate is examined. Investigations of these problems are carried out within the scope of the piecewise homogeneous body model by utilizing the so-called 3D linearized theory of stability loss for piezoelectric materials [1]. It is assumed that band cracks lay on the interface surfaces between the face (PZT layers) and core (Metal) layers of the plate along the axis and the lateral edges of the plate are mechanically simply supported. Two types boundary conditions are considered with respect to the electrical quantities. For the first one it is assumed that electrical potentials are equal to zero on all the face planes and lateral edges of the PZT layers. However, in the second one it is assumed that on the upper and lower face planes of the PZT layers the normal component of the electric displacement vector is equal to zero but on the all lateral edges of that the electric potential is equal to zero. Moreover, it is assumed that on the opposite two ends of the plate which are parallel to the band cracks fronts, uniformly distributed normal compressive mechanical forces act. Also, it is assumed that neither mechanically nor electrically any forces act on the cracks surfaces. It is supposed that in the natural state the cracks edge surfaces have infinitesimal initial imperfections and due to aforementioned external compressive forces the magnitude of these imperfections grow and becomes indefinitely great under the certain value of these forces. Namely, as in [2], this "certain" value of the external forces is taken as critical forces related to the buckling delamination of the plate under consideration. The mathematical formulation of the problem under consideration is made as in [3] and corresponding boundary value problems are solved numerically by employing 3D FEM. Numerical results illustrated the influence of the difference of the boundary conditions with respect to the electrical quantities on the values of the critical forces are presented and discussed.

Keyword: Piezoelectric material, electrical potential, band crack.
REFERENCES

Numerical Methods for the Solution of Delay Differential Equations with Small Parameter

Fevzi Erdogan ¹, Ercan Celik ², Mehmet Giyas Sakar ³

Abstract. We consider numerical methods on solution of a class initial value problems for delay differential equations with small parameter. Numerical methods are constructed in a uniform and nonuniform meshes on each time subinterval which gives first order uniform convergence in the discrete maximum norm. An error analysis shows that the methods are first order convergent in the discrete maximum norm, independently of the small parameter. The parameter uniform convergence is confirmed by numerical computations.

Keyword: Delay differential equations; Differential equations with small parameter; Finite difference scheme.

AMS 2010: 65L10 65L12 65L50

References


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Multilevel Quasi-interpolation on a Sparse Grid with the Gaussian

Fuat Usta 1 and Jeremy Levesley 2

ABSTRACT. Motivated by the recent multilevel sparse kernel-based interpolation (MuSIK) algorithm proposed in [Georgoulis, Levesley and Subhan, SIAM J. Sci. Comput., 35(2), pp. A815-A831, 2013], we introduce the new quasi-multilevel sparse interpolation with kernels (Q-MuSIK) via the combination technique. The Q-MuSIK scheme achieves better convergence and run time in comparison with classical quasi-interpolation; namely, the Q-MuSIK algorithm is generally superior to the MuSIK methods in terms of run time in particular in high-dimensional interpolation problems, since there is no need to solve large algebraic systems. We subsequently propose a fast, low complexity, high-dimensional quadrature formula based on Q-MuSIK interpolation of the integrand. We present the results of numerical experimentation for both interpolation and quadrature in $\mathbb{R}^d$, for $d = 2$, $d = 3$ and $d = 4$.

Keyword: Quasi-interpolation, multilevel algorithm, sparse grids, hyperbolic crosses, quadrature, high dimensional approximation.


REFERENCES


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**Abstract.** In this presentation, we first obtain some generalized Montgomery identities for generalized fractional integral operator. Then, using these Montgomery identities, we establish some Ostrowski type inequalities for function whose derivatives are bounded. We further obtain generalized inequalities for mappings whose absolute value of derivatives are convex.

Keyword: Montgomery identity, Ostrowski inequality, fractional integral, convex function.


**References**


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A DISCRETE REGULARIZATION FOR PROBABILISTIC GRAPHICAL MODELS

Galyna Kriukova 1

ABSTRACT. In our study we consider a non-parametric hidden Markov model (HMM) that extends traditional HMMs to structured and non-Gaussian continuous distributions by means of embedding HMM into Reproducing Kernel Hilbert Space (RKHS). Much recent progress has been made for Hilbert space embedding in probabilistic distributions and their application to HMM [1, 2].

Due to interference and ill-posedness of the inverse problem arising at learning of embedded HMM into RKHS, regularization is required. Proposed training algorithms use \( L_1 \), \( L_2 \) and truncated spectral regularization to invert the corresponding kernel matrix. In our research, we consider more general regularization techniques [3], discrete regularization method [4], specifically, Nyström-type subsampling [5]. Moreover, simultaneous regularization by means of Nyström-type subsampling and improved optimization technique enable us to use this approach for online algorithms.

In the present study, regularization scheme is equipped with a strategy for choosing a regularization parameters, which is based on the idea of a linear combination of regularized solutions corresponding to different values of the regularization parameter. The coefficients of the linear combination are estimated by means of the so-called linear functional strategy [6].

We investigate, both theoretically and empirically, regularization and approximation bounds of the discrete regularization method. Furthermore, we discuss applications of the method to real-world problems, comparing the approach to several state-of-the-art algorithms.

Keyword: probabilistic graphical model, hidden Markov model, data stream mining, reproducing kernel Hilbert space, online algorithm, regularization.

AMS 2010: Primary 65J20, Secondary 47A52.

REFERENCES


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Some Extreme Cases in Sector Arithmetic

Gültekin Soylu¹

Abstract. The arithmetic of complex intervals is a problem that has been tried to be solved in different ways. One perspective is to take the complex variables in polar coordinates. This way the arithmetic might be called sector arithmetic. In sector arithmetic the addition is a problem since the addition of two sectors does not yield to a sector. The problem therefore transforms into finding the minimum covering sector of the sum of two sectors. The solution generally seems to be easy since the endpoints of the minimum covering sector can be calculated by the endpoints of the given addends. But in some particular choices this is not the case. We will introduce and discuss some of those situations where the minimum covering sector unexpectedly can not be calculated easily by the endpoints of the given sectors. The talk will include solutions to those extreme cases.

Keyword: Interval arithmetic, complex sets, polar form.


References


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INVESTIGATION OF THE MOLECULAR ORBITAL ENERGIES OF \( C_{24}H_{27}NiN_5O_4 \) THE COMPLEX

Hümeýra Batı ¹, Çiğdem Yüksektepe Ataol ² and Bekir Batı ³

Abstract. The single crystal of \( C_{24}H_{27}NiN_5O_4 \) has the oxime and hydrazone groups. Acyl/aroylhydrazonooximes are a special group of Schiff bases derived from the condensation reaction between aliphatic or aromatic acid hydrazide compounds and keto oximes. They are characterized by the presence of \( RC(=O)NHN=CR_1R_2 \) moiety, where \( R, R_1 \) can be H, alkyl or aryl and \( R_2 \) is oximic groups. There is growing interest in aroylhydrazono oximes and their coordination compounds due to their wide applications in industry, medicine, synthetic, analytical bio- and coordination chemistry [1, 4]. In this work, the single crystal structure of \( C_{24}H_{27}NiN_5O_4 \) has been investigated by X-ray diffraction. Single crystal X-ray diffraction results show that \( C_{24}H_{27}NiN_5O_4 \) crystallizes in the triclinic system, space group. The molecular structure of the title compound in both the ground state (in vacuo) and water media has been optimized by Density Functional Theory (DFT) with B3LYP/631G, B3LYP/6311G, and B3LYP/LanL2Dz basis sets. The bond parameters of the compound have been compared with the X-rays and the theoretical calculation results. And then, molecular orbital energies of the molecular structure were calculated by using DFT.

Keyword: Oxime, hydrazone, DFT.

References


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STRETCHING OF VISCOUS THREADS

Jonathan Wylie

ABSTRACT. We investigate the motion of a slender axisymmetric highly viscous threads that are extended either by gravity or by an applied stretching force. Using matched asymptotic expansions, we obtain solutions for the full initial-boundary-value problem and show how inertia ultimately must become important. The solution allows us to understand the complicated mechanisms that underlie highly persistent filaments. This is joint work with B. Hajek, H. Huang, R.M. Miura and Y.M. Stokes.

Keyword: Viscous Fluid Flow, pinching.
Abstract. Controllability invariant subspaces generalize the notion of invariant subspaces under an endomorphism. Their study began in 1935 (von Neumann) and the generalization was considered by different authors in the 1970’s (Francis, Wonham, Morse, Basile, Marro,...) and applied to the study of controllability of control linear systems. They have been used to the study of different problems, as behaviour of the system and decouplings, among others.

Recall that given a control linear system \( \dot{x}(t) = Ax(t) + Bu(t) \), with \( A \in \mathbb{M}_n(\mathbb{R}) \), \( B \in \mathbb{M}_{n \times m}(\mathbb{R}) \), a vector subspace \( V \subseteq \mathbb{R}^n \) is a controllability invariant subspace if \( AV \subseteq V + \operatorname{Im} B \). They are proved to be the geometrical loci of trajectories of the system (see [1]). In the case of singular linear systems (see [2] for a complete study of such systems) a generalization of controllability invariant subspaces was given by Buzurovic (see [5]): given a singular control linear system \( E\dot{x}(t) = Ax(t) + Bu(t) \) with \( E, A \in \mathbb{M}_n(\mathbb{R}) \), \( B \in \mathbb{M}_{n \times m}(\mathbb{R}) \), \( \operatorname{rk} E < n \), a vector subspace \( V \subseteq \mathbb{R}^n \), \( \ker E \subseteq V \), is a control invariant subspace if \( AV \subseteq EV + \operatorname{Im} B \).

We recall now the definition of switched linear systems (see [6] for a complete treatment of these systems and more accurate definitions). Given an initial time \( t_0 \), a switching path is a mapping \( \sigma : [t_0,T) \rightarrow M \), \( t_0 < T \leq \infty \) and \( M = \{1, \ldots, m\} \). A switching sequence \( \{(t_j, i_j)\}_{j=0}^{\ell} \) uniquely determines a switching path, up to reordenation of the values of the switching path in the switching times, by: \( \sigma(t) = i_0 \quad t \in [t_0, t_1), \quad i_1 \quad t \in [t_1, t_2), \ldots, \quad i_{\ell} \quad t \in [t_\ell, T) \). A switching linear system \( \Sigma \) is a system which consists of different linear subsystems and a switching path \( \sigma \) determining the switching between the subsystems. In the continuous case, system \( \Sigma \) can be expressed as follows:

\[
\dot{x}(t) = A_{\sigma(t)}x(t) + B_{\sigma(t)}u(t)
\]

with \( A_{\sigma(t)} \in \{A_1, \ldots, A_\ell\}, A_i \in \mathbb{M}_n(\mathbb{R}), B_{\sigma(t)} \in \{B_1, \ldots, B_\ell\}, B_i \in \mathbb{M}_{n \times p}(\mathbb{R}), i = 1, \ldots, \ell \).
Abstract. (Continuation) Our aim is to generalize this notion to the case of a class of hybrid systems: switched linear systems, which have been widely studied in recent years and proved to appear in many areas of engineering, for example, as when studying electrical circuits and other fields as chemistry (see [4]). We are interested in including the case where at least one of the subsystems is a singular system (we will say that the switching system is a singular switched linear system).

In short, controllability invariant subspaces for switched linear systems are invariant subspaces which are invariant for all the subsystems the system consists of. This problem is related to that of finding common invariant subspaces for a set of matrices (or endomorphisms).

Keyword: Controllability invariant subspace, Switched linear systems.

AMS 2010: 93C05, 93C10.

References

THE DIFFERENCE SCHEMES FOR SOLVING SINGULARLY PERTURBED THREE-POINT BOUNDARY VALUE PROBLEM

Musa Cakir ¹, Erkan Cimen ², Gabil M. Amiraliyev ³

ABSTRACT. In this paper, numerical treatment for the singularly perturbed convection-diffusion boundary value problem with nonlocal condition is proposed and analyzed. First, the boundary layer behavior of the exact solution and its first derivative have been estimated. Then, finite difference scheme on uniform mesh is constructed. The uniform convergence of the proposed difference scheme is proved and given the error estimate. Numerical examples which demonstrate computational efficiency of proposed method are also presented.

Keyword: Singular perturbation, exponentially fitted difference scheme, uniform mesh, uniformly convergence, nonlocal condition.
AMS 2010: 65L05, 65L70, 65L12, 65L20, 34D15.

REFERENCES


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AN ITERATIVE APPROXIMATION FOR TIME-FRACTIONAL CLANNISH RANDOM WALKER’S PARABOLIC EQUATION IN REPRODUCING KERNEL SPACE

Mehmet Giyas Sakar ¹, Fevzi Erdogan ², Onur Saldır ³

Abstract. In this article, a novel iterative approximation is constructed by using reproducing kernel method for Clannish Random Walker’s Parabolic (CRWP) equation with Caputo derivative. Representation solution is constructed and convergence analysis is made. Numerical results are given as tables and graphics to shows of power and influence of method. The results indicate that the method has uniformly convergence for CRWP equation with fractional derivative.

Keyword: Caputo derivative, CRWP equation, reproducing kernel, convergence. AMS 2010: 35R11, 46E22.

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ABSTRACT. Spherical Harmonics have large applicability area in mathematical modeling of different 3D objects. One of the most important area is related to medicine, to be more specific to 3D image reconstruction of tumors or internal organs. Starting from a cloud of 3D points resulted from a set of Computer Tomography scans the 3D image can be reconstructed. Usually, to find an accurate approximation of the 3D object a mathematical model is needed. One approach is the Spherical Harmonics functions. For a certain bandwidth, using least square method a large linear system of equations is obtained. A fast linear solver is needed in this case and for this Arnoldi methods can be used. The result is a more refined 3D object description and in the case of tumor shape reconstruction the planning for irradiation with particles beams can be securely started. The more complex situation is the case of 3D moving rotating object when the irradiation planning needs to be done in real time and where very good complexity algorithms are needed.

Keyword: Mathematical modeling, Spherical Harmonics, Linear Systems of Equations, Least Square Method

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AN ANALYTICAL APPROACH FOR CONFORMABLE FRACTIONAL DIFFERENTIAL EQUATIONS

Meryem Odabasi

ABSTRACT. Fractional order differential equations can be used to model physical phenomena more accurately. Finding analytical solutions of these equations have become more important because of the applications in mathematical physics, applied mathematics and other branches of science. In this study, by means of the complete discrimination system and trial solution method, traveling wave solutions of some important conformable fractional differential equations have been obtained and also the solutions are illustrated.

Keyword: Analytical methods, conformable fractional differential equations, traveling wave solutions.
AMS 2010: 35A20, 35R11, 35C07.

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ON \((p, q)\)-anologue of Baskakov-Stancu-Kantorovich Operators

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ABSTRACT. In the presentation, we deal with Stancu type generalization of \((p, q)\)-Baskakov-Kantorovich operators. Post-quantum calculus, namely \((p, q)\)-calculus is a generalization of \(q\)-calculus. The new parameter \(p\) satisfies suppleness to the approximation. We prove the convergence of the new operators by using the weighted Korovkin theorem. Then, we estimate the moments and investigate direct results by the help of modulus of continuity and Peetre’s K-functional. Additionally, we give pointwise estimation with the help of functions, which are belong to Lipschitz class. Moreover, we demonstrate the Voronovskaya type theorem for our operators. Finally, we illustrate some figures to show the convergence of the constructed operators to some selected functions.

Keywords: \((p, q)\)-Baskakov-Kantorovich-Stancu operators, weighted Korovkin theorem, Voronovskaya type theorem.


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Investigation of the Solvent Effect on Molecular Orbital Energies of C_{13}H_{17}N_{3}O_{3} the Single Crystal

Nezihe Çalışkan ¹, Çiğdem Yüksektepe Ataol ² and Hümayra Batı ³

Abstract. The single crystal of C_{13}H_{17}N_{3}O_{3} has the oxime and hydrazone groups. Oximes and their metal complexes are used in many areas such as medicine, bioorganic systems, catalysis, electrochemical and electro-optical sensors [1, 2]. Hydrazones possessing an azomethine –NHN = CH− proton form an important class of compounds for new drug development. Therefore, many researchers have synthesized these compounds and their metal complexes as structures and utilized their biological activities [3]. In this work, the single crystal structure of C_{13}H_{17}N_{3}O_{3} has been investigated by X-ray diffraction. Single crystal X-ray diffraction results show that C_{13}H_{17}N_{3}O_{3} crystallizes in the monoclinic system, space group P21/c. The molecular structure of the title compound in the ground state (in vacuo) has been optimized by Density Functional Theory (DFT) to include correlation corrections with the 6311G(d, p) and B3LYP/6-31G basis sets. In DFT calculations, hybrid functionals are also used, including the Beckes three-parameter functional (B3) [4], which defines the exchange functional as the linear combination of Hartree-Fock, local, and gradient-corrected exchange terms. The B3 hybrid functional was used in combination with the correlation functionals of Lee et al. [5]. The bond parameters of the compound have been compared with the X-rays and the theoretical calculation results. Molecular orbital energies of the molecular structure were calculated using TD-DFT with ultraviolet spectroscopy technique using the optimized structures with different basis sets. First, the molecular orbital energy levels in a gas phase are calculated using the B3LYP/6-31G and B3LYP/6-311G (d, p) methods, and then the energy levels of this molecular structure are calculated in different solvent environments to investigated the solvent effect on the molecular energy levels and dipole moment.

Keyword: Oxime, hydrazone, DFT.
REFERENCES

Note on Baskakov-Schurer-Szász Operators Preserving constant and $e^{2ax}, a > 0$

Övgü Gürel Yılmaz 1, Murat Bodur 2 and Ali Aral 3

Abstract. This paper is concerned with Baskakov-Schurer-Szász operators which preserving constant and $e^{2ax}, a > 0$. We discuss a uniform convergence result and estimate a quantitative asymptotic formula for the modified operators. Also, the convergence of the corresponding operators is considered in weighted spaces and a comparison between classical Baskakov-Schurer-Szász operators and the recent sequence is given.

Keyword: Baskakov-Schurer-Szász operators, exponential functions, weighted approximation.

AMS 2010: Firstly 41A25, Secondly 41A36.

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Abstract. Any nonlinear integrable dynamical system of coherently coupled intra-site excitations associated with one or another semi-discrete zero curvature representation whose auxiliary spectral matrix has the determinant dependent on the spectral parameter is claimed to possess the set of concomitant fields dependent on the set of basic field variables. The nonzero background level of concomitant fields turns out to be the source of additional background-controlled inter-site coherent (resonant) interactions between the basic excitations. As a result, the primary purely one-dimensional spatial lattice dealing with the auxiliary linear problem is converted into a ladder-like arrangement of sites in the secondary lattice ribbon serving as a spatial support for the basic fields. The effect of lattice ribbonization gives rise to the rather nonstandard Poisson structure involved into the Hamiltonian equations as well as to the essential enrichment of the whole system’s dynamics. For example, depending on the background level of concomitant fields the system is able to experience the crossover in the very origin of its excitations. Nevertheless, the system is found to afford the soliton and multi-soliton solutions with the soliton parameters accumulating the contributions of both the usual inter-site resonant couplings and the additional background-controlled ones. Despite of its nontriviality the challenging problem of standardization is proved to be successfully solved in terms of properly chosen physically corrected fields at least for certain particular nonlinear integrable systems.

Keyword: Nonlinear integrable system, background-controlled resonant coupling, ribbon-like lattice, Hamiltonian function, Poisson structure, crossover effect, multi-component soliton.

AMS 2010: 37K10, 35Q55, 37K60, 37K05, 37J35, 37K35.

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MODELING OF THE CARBON MONOXIDE OXIDATION BY NITROUS OXIDE REACTION ON THE COMPOSITE CATALYSTS

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ABSTRACT. The carbon monoxide (CO) oxidation by nitrous oxide (N\textsubscript{2}O) reaction, CO + N\textsubscript{2}O \to N\textsubscript{2} + CO\textsubscript{2}, proceeding on the composite (supported) catalysts [1, 2] at the constant temperature, is studied by using a phenomenological model described by a coupled system of PDEs. This model is based on the Langmuir–Hinshelwood surface reaction mechanism and includes the bulk diffusion of both reactants and two reaction products, adsorption and desorption of particles of both reactants, and surface diffusion of adsorbed molecules. The bulk diffusion is described by the Fick law while the surface diffusion of the adsorbed particles is based on the particle jumping mechanism [3] via the catalyst-support interface. The spillover phenomenon [4] is taking into account and the nonclassical conjugation conditions are used at the catalyst-support interface. The dependence of the surface reactivity of the composite catalysts on the initial concentrations of both reactants, their adsorption and reaction rate constants and particle jumping rate constants via the catalyst-support interface is investigated numerically using a finite difference technique.

Keyword: Heterogeneous reactions, spillover, surface diffusion.
AMS 2010: 00A69.

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Unstable Interfacial Mixing Driven by Shock Waves

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Abstract. A material interface between two compressible fluids of different density is unstable when the interface is accelerated by an incident shock wave. Small disturbance at the material interface grow in size to form fingers. This is known as Richtmyer-Meshkov instability. It is very difficult to provide accurate theoretical predictions for the growth rates and amplitudes of fingers at the unstable material interface. This is due to the complication of the shock waves and the rarefaction wave presented in the compressible fluid systems and due to the nonlinearity of finger growth at late times. Numerical simulations have been the main tools for studying the finger growth in Richtmyer-Meshkov instability in compressible fluids. In this talk, we present a new close-form approximate solution for the growth rate and amplitude of unstable fingers of Richtmyer-Meshkov instability in compressible fluids. Our theoretical approach is based on analyzing the solutions at early and late times and asymptotically matching these two solutions. Our theory contains no fitting parameters. We show that our theoretical predictions for the growth rates and amplitude of fingers of Richtmyer-Meshkov instability in compressible fluids are in remarkably good agreements with the results from numerical simulations and with the data from experiments from early to late times. Even for a compressible fluid system driven by an incident shock of Mach number being as high as 15.3, our theoretical predictions are still in an excellent agreement with the data from the numerical simulations.

Keyword: shock wave, interfacial instability, nonlinear dynamics

AMS 2010: 76E17, 74J40.

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ON HARMONIC FUNCTIONS BY MEANS OF LAGRANGE POLYNOMIALS

Rabia Aktaş ¹ and Fatma Taşdelen ²

ABSTRACT. In this study, we first give some properties of homogeneous operators associated with Lagrange polynomials and then in view of these properties, by applying the Laplace operator to the Lagrange polynomials, a harmonic function is obtained in terms of Laplace operator and Lagrange polynomials.

Keyword: Lagrange polynomials, Laplace operator, harmonic function.
AMS 2010: 33C55, 42B37

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On the Uniqueness of the Nash Equilibrium in Stochastic Games of Capital Accumulation on a Graph

Ruslan K. Chornei 1

ABSTRACT. The main purpose of this work is the study of the application of controlled random fields given on a finite non-oriented graph described in [1], to the problem of the uniqueness of the Nash-equilibrium for stochastic capital accumulation games with many players. The players are located at the vertices of the interaction graph Γ, the edges represent the connections between the players. We assume that the decisions of the players are synchronized using a standard assumption of decision making in discrete time sequential games.

The problem of the existence of the Nash equilibrium for this type of games is considered in the work [2]. In order to show the existence of a single equilibrium, additional conditions on transitional probabilities and utility functions apply.

The direct impetus for writing this article was the work of Balbus, Nowak [3] and Wieçek [4] based on the results of Amir [5]. In this paper we summarize the results of Balbus, Nowak [3] and Wieçek [4] on a multidimensional model: players are concentrated at the vertices of a finite graph that determines their local interaction. Such a generalization makes it possible to use in real economic models with "neighborhood dependence" (for example, see [6]) for describe the process of capital accumulation.

Keyword: Markov decision process, stochastic game, Nash equilibrium, capital accumulation, random fields, local interaction.
AMS 2010: 90C40, 91A15.

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AN EHRLICH-TYPE ACCELERATED METHOD WITH KING’S CORRECTION FOR THE SIMULTANEOUS APPROXIMATION OF POLYNOMIAL ZEROS

Roselaine Neves Machado 1, Luiz Guerreiro Lopes 2

ABSTRACT. In this work, we present a new accelerated simultaneous method for approximating all the zeros of a polynomial, which uses the well-known third order Ehrlich–Aberth iteration [1, 2] and a correction based on King's method [3]. The R-order of convergence of the new combined iterative method is at least six. Numerical examples are provided to illustrate the computational efficiency and accuracy of the proposed accelerated method for the simultaneous determination of polynomial zeros.

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Keywords: Polynomial zeros, simultaneous iterative methods, combined methods, accelerated convergence, Ehrlich method.


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Discrete Fractional Solutions of a Gauss Equation

Resat Yilmazer ¹, Neslihan Sabriye Demirel ²

Abstract. One of the most popular research interests of science and engineering is the fractional calculus theory in recent times. Discrete fractional calculus has also an important position in fractional calculus. In this work, we acquire some new explicit solutions of the Gauss differential equation by using discrete fractional nabla operator. The most important advantage of the method is that it can be applied for singular equations.

Keyword: Discrete fractional calculus, Fractional analysis, Gauss equation.

AMS 2010: 26A33, 34A08.

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Solutions of the Generalized Laguerre Differential Equation by Fractional Differintegral

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Abstract. Fractional calculus techniques contribute to many fields of science and engineering such as applied mathematics, control theory, economy, nuclear magnetic resonance, optics, robot technology and so on. By means of fractional calculus techniques, we find explicit solutions of the Laguerre differential equations. We use the N-fractional calculus operator to obtain the solutions of these equations. The most important advantage of the method is that it can be applied for singular equations.

Keyword: Fractional differintegral, Fractional calculus, Laguerre equation.
AMS 2010: 26A33, 34A08.

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Adaptive Robust Ts Fuzzy Control of Unknown Nonlinear Systems
Selami Beyhan

Abstract. This paper introduces a novel controller design which is constructed based on adaptive control of TS fuzzy system framework. When we do not know the physical dynamics of the nonlinear system, usually direct and indirect adaptive controllers, and generalized predictice controller are designed which are not robust to uncertainties of the system and environment. In this work, the system is first controlled by an adaptive TS fuzzy controller at the same time the system identification of the system is continued. After a while, based on the constructed TS fuzzy system, LMI based controller parameters for the TS fuzzy system are designed and continued to control the system. After that beside the robust TS fuzzy controller, an adaptive controller is continued to produce a control input for the unmodeled unknown dynamics. By doing that a robust TS fuzzy controller is constructed for an unknown nonlinear system.

Keyword: Adaptive fuzzy control, TS fuzzy system modeling and control, nonlinear system control.

References

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Abstract. In the present study, the influence of material constants on the torsional vibration of a hollow sphere with non-homogeneous initial stresses is studied within the exact equations of three dimensional linearized theory of elastic waves in initially stressed bodies [1]. The material of the sphere is assumed homogeneous and isotropic and the uniform radial forces act on the inner or outer surfaces of the sphere that cause inhomogeneous initial stresses in this sphere. Solutions of the corresponding eigenvalue problems for the inhomogeneous initial stressed hollow sphere require to solution of the system of three partial differential equations with variable coefficients. So, the solution of this system is achieved by using the discrete-analytical solution method proposed in [2, 3]. The influence of some material parameters as well as initial stresses on the natural frequencies of the torsional vibration of this sphere are analyzed and discussed. Analyzing the numerical results show that material constants and initial stresses in the sphere are significantly affected on the fundamental frequency of the torsional vibration of the considered sphere.

Keyword: torsional vibration, hollow sphere, initial stress.

References

Finding Source Function of Diffusion Problem with Time-Fractional Derivative
Simge Dedeoğlu ¹, Vildan Gülkaç ²

Abstract. In the previous work “Analytic Method of Finding Source Function for Diffusion Problem with Time-Fractional Derivative” we obtained the results where the source function is polynomial [1].

In this study, Laplace Transformation is applied to given diffusion problem and the results of the case where the source function is exponential and trigonometric are investigated [2-5].

Keyword: Laplace Transformation, Diffusion Problem, Time-Fractional Derivative, Invers Problem.
AMS 2010: 26A33, 34A08, 44A10, 31B20.

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COMPARISON OF TRIGONOMETRICALLY FGM EULER-BERNOULLI BEAM LINEAR SOLUTIONS WITH TWO METHODS; FINITE DIFFERENCE METHOD AND DIFFERENTIAL QUADRATURE METHOD

Sümeyye Sinir 1, Bengi Yildiz 2

ABSTRACT. Functionally graded beams (FGBs) have remarkable advantages in many engineering structures. In recent years, there has been a large number of researches on mathematical modeling, engineering applications, stress, vibration and fracture analysis, etc. of functionally graded material (FGM) structural elements. An attention has also been shown on how to develop a mathematical model to estimate the behavior of FGBs.

In this study, the well-known modeling Euler-Bernoulli beam model is considered with the material properties change trigonometrically along the beam [1, 2, 3, 8]. The mathematical model of FGM Euler-Bernoulli beam is solved with finite difference method which is widely used in the solutions of engineering problems. The obtained solutions which are the natural frequencies and mode shapes of functionally graded beam are compared with the solutions of differential quadrature method [8, 9].

Keyword: functionally graded material euler-beroulli beam, linear model, finite difference methods, differential quadrature method.
AMS 2010: 74S20.

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Existence, Uniqueness and Long Time Dynamics for Functional Three-Dimensional Navier-Stokes-Voigt Equations

T. Caraballo and Antonio M. Márquez Durán

Abstract. The Navier-Stokes-Voigt (NSV) system models the dynamics of a Kelvin-Voigt viscoelastic incompressible fluid and was introduced by Oskolkov in [1] as a model of the motion of linear viscoelastic fluids.

Our aim in this paper is to consider the following version of this problem for a variety of delay terms in a unified formulation, and to study the long time behavior of the solutions, which suppose a generalization of some recent works (see [2], [3]):

\[
\begin{aligned}
\frac{\partial}{\partial t}(u - \alpha^2 \Delta u) - \nu \Delta u + (u \cdot \nabla)(u) + \nabla p &= f(t) + g(t, u_t), \quad \text{in } (\tau, +\infty) \times \Omega, \\
\nabla \cdot u &= 0, \quad \text{in } (\tau, +\infty) \times \Omega, \\
u = 0, \quad \text{on } \partial \Omega \times (\tau, +\infty), \\
u(\tau, x) &= u^\tau(x), \quad \text{in } \Omega, \\
u(\tau + t, x) &= \phi(t, x), \quad \text{in } (-h, 0) \times \Omega,
\end{aligned}
\]

and where \( \Omega \subset \mathbb{R}^3 \) be a bounded domain with smooth enough (e.g., \( C^2 \)) boundary \( \partial \Omega \), \( \tau \in \mathbb{R} \) is the initial time, \( u = (u_1, u_2, u_3) \) is the unknown velocity field of the fluid and \( p \) is the unknown pressure, and we are given the kinematic viscosity \( \nu > 0 \), a length scale parameter \( \alpha > 0 \), characterizing the elasticity of the fluid (in the sense that the ratio \( \alpha^2/\nu \) describes the reaction time that is required for the fluid to respond to the applied force), an initial velocity field \( u^\tau \) at the initial time \( \tau \in \mathbb{R} \), \( \phi \) is a given function defined in the interval \( (-h, 0) \), and an external force term \( f \), depending on time. The time-dependent delay term \( g(t, u_t) \) represents, for instance, the influence of an external force with some kind of delay, memory or hereditary characteristics, although can also model some kind of feedback controls. Here, \( u_t \) denotes a segment of the solution, in other words, given \( h > 0 \) and a function \( u : [\tau - h, +\infty) \times \Omega \to \mathbb{R} \), for each \( t \geq \tau \) we define the mapping \( u_t : [-h, 0] \times \Omega \to \mathbb{R} \) by

\[
u u_t(\theta, x) = u(t + \theta, x), \quad \text{for } \theta \in [-h, 0], x \in \Omega.
\]

Keyword: Navier-Stokes-Voigt model, delay terms, long time dynamics.
REFERENCES


ON THE SOLITARY WAVE SOLUTIONS TO THE (2+1)-DIMENSIONAL CUBIC KLEIN-GORDON AND MODIFIED ZAKHAROV-KUZNETSOV EQUATIONS

Tugba Yazgan 1, Hasan Bulut 2

ABSTRACT. In this paper, the extended sinh-Gordon equation expansion method is used in constructing various solitary wave solutions to the (2+1)-dimensional cubic Klein-Gordon and modified Zakharov-Kuznetsov equations such as the topological, non-topological, topological kink-type, non-topological kink-type and singular soliton solutions. All the reported solutions in this study verify their corresponding equation. We also plot the 2D and 3D graphics to the obtained solutions. We compare our results with some reported results in the literature. We finally present a comprehensive conclusion.

Keyword: The extended ShGEEM; cKG; mZK; topological., Difference Sequences.
AMS 2010: 70K60,81Q05,35Q40,65N12.

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Sudoku Verification with Characteristic Polynomials

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Abstract. Sudoku solution verification was demonstrated [1] at Bitcoin workshop, Financial Crypto 2016. This verification is solving a conflict of interests: seller wants to send his solution only after receiving the payment, and buyer wants to be sure solution is valid before he pays. This conflict was resolved with a SNARK proof and a pay-to-script transaction [2]. The key property of this proof is, solution validity can be verified in a way that solution itself is not available to the verifying party. Polynomial representation was shown useful for proving statements about graphs, in particular, for verifying equivalent statements about characteristic polynomials. Interactive proof systems of reduced communication complexity were constructed [3, 4] that could be considered an extension of Schnorr proof with higher degrees of the challenge of verifier. SNARKs is recent development [5] in non-interactive proofs, and a core part of Zcash coins system.

To investigate applicability of polynomial representation idea in the context of SNARKs, we introduce polynomial representation for Sudoku solution. This representation extends solution verification originally introduced at [6]. We test validity of each set representing all rows, columns, and blocks of the solution with characteristic polynomials. We test that each such polynomial is equivalent to the pre-defined polynomial produced from the expected set. We introduce an R1CS circuit for verifying whether solution is valid and whether it matches the puzzle. A SNARK proof can be produced with this circuit, with sudoku solution serving as the witness. Unlike Bowe-Maxwell, our circuit only does two verifications as stated, and could be extended to also test hash pre-image serving as the encryption key. Our circuit complexity is $5N^4 + 3N^2$ constraints (multiplication gates) for Sudoku instance of $N^2 \times N^2$ size. We confirm our analysis by implementing this circuit [7] with libsnark [8]. We conclude that polynomial representations could be beneficial in the context of non-interactive proof systems in terms of reduced circuit complexity.

Keyword: Set characteristic polynomial, Non-interactive proof system, Zero knowledge.

AMS 2010: 11B34, 03F99.

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[8] https://github.com/scipr-lab/libsnark
Results and Conjectures About Mixing Problems ODE Linear Systems

Victor Martinez-Luaces

Abstract. Mixing problems are very common in Differential Equations textbooks since they always lead to linear ODE systems [1-3]. From an algebraic view point, the corresponding associated matrices have different structures that deserve to be studied deeply [4-5].

In this article, it is shown that the matrix structure depends on whether or not there is recirculation of fluids and if the system is open or closed, as well as other important characteristics like the number of tanks and their internal connections.

Several statements about the matrix eigenvalues for different geometrical structures and internal connections can be posed by applying the Gershgorin Disks Theorem [6] and some qualitative remarks about the differential equations system solutions and their stability or asymptotical stability are also included.

Several statements about the matrix eigenvalues for different geometrical structures and internal connections can be posed by applying the Gershgorin Disks Theorem [6]. Also, some qualitative remarks about the differential equations system solutions and their stability or asymptotical stability are included.

Finally, some open problems and a couple of conjectures are posed.

Keyword: eigenvalues, Gershgorin Circles Theorem, mixing problems, ODE linear systems, associated matrices.


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CALCULUS OF THE DISTRIBUTION OF SACRIFICIAL ANODES FOR ROOF OIL TANKS
CATHODIC CORROSION PROTECTION

Victor Martinez-Luaces ¹, Lucia Campo ², Mauricio Ohanian ³

ABSTRACT. Sacrificial anodes are a well-known technique widely used to protect different metallic structures. In the case analyzed, the oil tanks maintenance of ANCAP (Uruguayan Petroleum State owned Company) required the design of their cathodic protection [1]. The system design implies assign the anodic material and calculate the mass and number of anodes. Their position is usually determined by empiric methods or partially based in corrosion potential distribution theory. In this paper, we present a development of calculus for the sacrificial anodes position to ensure the total roof surface protection. In order to determine the position and number of the anodes, we started considering a mass balance which was later transformed into a charge balance. After several transformations the mathematical model resulted into an elliptic PDE problem, expressed in cylindrical coordinates with non-linear boundary conditions, as in a previous work [2]. The original problem was simplified by using the piecewise linearization method and applying Frumkin condition [3] that allowed assuming unidirectional flux. Following these ideas, the original PDE problem was converted into a second order ODE with variable coefficients which can be solved by using power series. Considering the previous analysis, an iterative process was proposed to calculate the radius of the sacrificial anodes to be installed.

Keyword: Elliptic PDE, power series, cathodic corrosion protection.
AMS 2010: 35C10, 35J65.

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Abstract. A flow-like mathematical model is proposed that represents a seismic field in the form of a convolution of a point process of the moments of occurrence of seismic events with signals that describe each such event. Signals are complex compositions of elastic waves of various types that arise both at the beginning of this process and during its propagation up to the moment of being recorded by a sensor. The concept of a generalized seismic signal is introduced. In this concept, it is taken into account that due to the natural background, which always complicates the analysis of the moment of occurrence of an event, the concept of a conditionally physically realizable signal is introduced. The prehistory of such a signal, before its appearance above the background level, is represented by a stochastic process with an indefinite time of signal appearance, but satisfying certain conditions. These conditions consist of the assumptions that its energy in the prehistory, before its excess of the background level, nowhere exceeded the energy of such a background, and that its derivative is a smooth function. The generalized seismic signal, depending on the values of the matrix of free parameters, describes various types of seismic waves. The matrix of free parameters of this model determines physically meaningful, both kinematic and dynamic, parameters of each event. In the model, it is taken into account that a specific additive micro-seismic noise accompanies the registration. At each registration point, in aggregate, we obtain a three-component vector stochastic process. For the data obtained in the experiment, on the set of alternative models, by means of a minimization of a criterion, the optimal one is chosen. The matrix of optimal values of free physically meaningful parameters is used to estimate the kinematic and dynamic characteristics of a seismic event at a fixed (arbitrary) observation point and for their interpretation. A set of matrices from different points of observation of the seismic field is used to interpret the seismic event.

Keyword: conditionally physically realizable signal, point process, generalized seismic signal.
GENERALIZED BETA DISTRIBUTED PARAMETERS FOR A SVEIR-TYPE RANDOM MODEL OF POLIO TRANSMISSION

Zafer Bekiryazici 1, Tulay Kesemen 2 and Mehmet Merdan 3

ABSTRACT. In this study, a SVEIR-type compartmental model of Poliomyelitis transmission is examined under random effects. We introduce Generalized Beta distributed random parameters into the equation system to investigate the random dynamics of the disease. The approximate analytical solution of the model under Generalized Beta random effects are obtained by using Random Differential Transformation Method (RDTM). Results from Monte-Carlo simulations and RDTM are analyzed to comment on the randomness of the compartments and disease transmission. It is seen that the random model successfully provides similar results that can be obtained through the deterministic model while providing additional information on the random behaviour of the disease.


AMS 2010: 34F05, 92B05.

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Abstract. For a simple graph $G$ and a real number $\alpha \neq 0, 1$ the graph invariants $s_{\alpha}$ and $\sigma_{\alpha}$ are equal to the sum of powers of the non-zero signless Laplacian and Laplacian eigenvalues of $G$, respectively. Note that $s_{1/2}$ and $\sigma_{1/2}$ are equal to incidence and Laplacian-like energies of $G$, respectively. In this study, we present some generalized new bounds on $s_{\alpha}$ and $\sigma_{\alpha}$ of (bipartite) graphs. As a result of these bounds, we also obtain the some generalized results on incidence and Laplacian-like energies of (bipartite) graphs.

Keyword: Incidence energy , Laplacian-like energy, bipartite graphs.
AMS 2010: 05C50, 05C90.

References


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Bounds for the Molecular Structure Descriptors

Ezgi Kaya ¹, A. Dilek Maden ²

ABSTRACT. For a graph $G$ having diameter 2, in this paper, we give some inequalities for the vertex PI and Szeged indices among inside of them over $G$. To do that, we will remove an edge $e$ such that the position of $e$ is on a triangle in $G$. Moreover, we present some bounds for the vertex PI and Szeged indices and Revised Szeged index for the general graph $G$ and we give some results for line graphs.

Keyword: vertex PI index, Szeged index, Zagreb indices.

AMS 2010: 05C12, 05C99.

REFERENCES


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²Selcuk University, Konya, Turkey, aysedilekmaden@selcuk.edu.tr
Abstract. In this talk, we present some new double sums including the binomial coefficient with Fibonacci numbers. These sums have nice results. We use Binet formulas for Fibonacci and Lucas numbers and Binomial theorem for proving the results.

Keyword: Fibonacci numbers, Lucas numbers, binomial coefficients.

AMS 2010: 11B39, 05A10.

References


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1Bozok University, Yozgat, Turkey, funda.tasdemir@bozok.edu.tr
Abstract. Let $c$ be a proper $k$-coloring of a graph $G$. Let $\pi = \{R_1, R_2, ..., R_k\}$ be the partition of $V(G)$ induced by $c$, where $R_i$ is partition class receiving color $i$. The color code $c_\pi(v)$ of a vertex $v$ of $G$ is the ordered $k$-tuple $(d(v, R_1), d(v, R_2), ..., d(v, R_k))$ where $d(v, R_i)$ is the minimum distance from $v$ to each other vertex $u \in R_i$ for $1 \leq i \leq k$. If all vertices of $G$ have distinct color codes, then $c$ is called a locating $k$-coloring of $G$. The locating-chromatic number of $G$, denoted by $\chi_L(G)$, is the smallest $k$ such that $G$ admits a locating coloring with $k$ colors. In this paper, we give a characterization of the locating chromatic number of powers of paths. Also, we find sharp upper and lower bounds for the locating chromatic number of powers of cycles.
The Periodicity of Solutions of a Higher Order Rational Difference Equation

Mehmet Gümmüs

Abstract. The aim of this paper is to investigate the periodicity of the difference equation

\[ x_{n+1} = \frac{\alpha x_{n-k}}{\beta + \gamma x_{n-l}^p x_{n-m}^q}, \quad n = 0, 1, \ldots \]

where \(k, l, m\) are positive integers, the parameters \(\alpha, \beta, \gamma, p\) and \(q\) are non-negative real numbers and the initial values \(x_{-\max\{k,l,m\}}, \ldots, x_{-1}, x_0\) are non-negative real numbers such that the denominator is always positive. Also, we give some examples to demonstrate the effectiveness of results obtained. Our results extend and generalize the known ones.

Keyword: Difference equation, equilibrium solution, periodicity.


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[1] D. Chen, X. Li and Y. Wang, Dynamics for nonlinear difference equation \(x_{n+1} = (\alpha x_{n-k})/(\beta + \gamma x_{n-1}^p x_{n-1}^q)\), Advances in Difference Equations, Volume 2009, Article ID 235691, 13 pages.


[3] M. Gümmüs, The Periodicity of Positive solutions of the nonlinear difference equation \(x_{n+1} = \alpha + (x_{n-k}^p/x_n^q)\), Discrete Dynamics in Nature and Society, vol.2013, Article ID 742912, 3 pages.


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Abstract. In recent years, many mathematicians studied on the generalized \( q \)-Bernolli, \( q \)-Euler, \( q \)-Genocchi polynomials, specially. Mahmudov introduced two variable \( q \)-Bernoulli numbers and \( q \)-Bernoulli polynomials. In this work, we introduce and investigate \( q \)-poly Genocchi numbers and \( q \)-poly Genocchi polynomials. We give some identities and explicit relations for this polynomials.

Keyword: \( q \)-Bernolli number and polynomials, \( q \)-Poly-Bernoulli, \( q \)-Poly-Euler, \( q \)-Poly-Genocchi polynomials, Stirling numbers of the second kind.

AMS 2010: 11B75, 33E30.

References

GEOMETRY
ON THE SECOND-ORDER TANGENT BUNDLE WITH DEFORMED 2-ND LIFT METRIC

Abdullah Magden 1 Kübra Karaca 2, Aydın Gezer 3

ABSTRACT. Let \((M, g)\) be a pseudo-Riemannian manifold and \(T^2 M\) be its the second-order tangent bundle equipped with the deformed 2-nd lift metric \(g\) which obtained from the 2-nd lift metric by deforming the horizontal part with a symmetric \((0,2)\)-tensor field \(c\). In the present paper, we first compute the Levi-Civita connection and its Riemannian curvature tensor field of \((T^2 M, g)\). We give necessary and sufficient conditions for \((T^2 M, g)\) to be semi-symmetric. Secondly, we show that \((T^2 M, g)\) is a plural-holomorphic \(B\)-manifold with the natural integrable nilpotent structure. Finally, we get the conditions under which \((T^2 M, g)\) with the 2-nd lift of an almost complex structure is an anti-Kähler manifold.

Keywords: Anti-Kähler manifold, Deformed 2-nd lift metric, Killing vector field, plural-holomorphic \(B\)-manifold, Semi-symmetry.

AMS 2010 : 53C07, 53C15, 53C35.

REFERENCES


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CHARACTERISTIC DIRECTIONS OF CLOSED PLANAR HOMOTHEtic INVERSE MOTIONS

Ayhan Tutar 1, Esra Inan 2 and Önder Şener 3

ABSTRACT. In this study, during one-parameter closed planar homothetic inverse motions, the Steiner area formula and the polar moment of inertia were expressed. The Steiner point or Steiner normal concepts were described according to whether rotation number is different zero or equal to zero, respectively. The fixed pole point was given with its components and its relation between Steiner point or Steiner normal was specified. The sagittal motion of a crane was considered as an example. This motion was described by a double hinge consisting of the fixed control panel of crane and the moving arm of crane. The results obtained in the first sections of this study were applied for this motion.

Keyword: Steiner formula, polar moment of inertia, planar kinematics, homothetic inverse motions.
AMS 2010: 53A17, 70B10.

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Abstract. In this work, we study general helices that lie on $S^{2n}$ in $E^{2n+1}$. We introduce a method to determine these curves. Moreover, we give examples by using the method that we have introduced.

Keyword: General helix, Spherical curve, Map.

This work is supported by Ahi Evran University Scientific Research Project Coordination Unit. Project number: EGT.A4.18.018.

References

New Approach to Slant Helix
Beyhan Yilmaz 1, Aykut Has 2

Abstract. A slant helix is a curve for which the principal normal vector field makes a constant angle with a fixed direction. In this study, we solve a system of linear ordinary differential equations involving an alternative moving frame, then determine the position vectors of slant helices through integration in Minkowski 3-space.

Keyword: Slant helix, Alternative moving frame.

References

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Some Characterizations for The Natural Lift Curve in Dual Space

Emel Karaca ¹, Mustafa Çalışkan ²

Abstract. The natural lift curve is the curve drawn by the end points of the tangents of the main curve. Frenet vector fields, curvature and torsion of the natural lift curve of a given curve are fundamental characteristics in differential geometry. In this paper, we present Frenet vector fields, curvature and torsion of the natural lift curve of a given curve by using dual angle between Darboux vector field and the binormal vector in dual space.

Keyword: Natural lift curve, Frenet frame, dual space.


References


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Chen Invariants for Submanifolds of Riemannian Product Manifolds

Erol Kılıç 1, Sadık Keleş 2, Rıfat Güneş 3 and Mehmet Gülbahar 4

Abstract. $k$-Chen invariants on submanifolds of a Riemannian product manifold is investigated. An optimal inequality involving the scalar curvatures and the $k$-Chen invariant for submanifolds, namely slant, F-invariant and F-anti invariant submanifolds of an almost constant curvature manifold is proved.

Keyword: Curvature, Riemannian product manifold, submanifold.

AMS 2010: 53C15, 53C40, 53C42.

Acknowledgements: This work is supported by İnönü University Scientific Research Coordination Unit with project number 1302.

References


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Caustics of Pseudo Spherical Curves

Fatma Ateş ¹, İsmail Gök ² and F. Nejat Ekmekçi ³

Abstract. We consider a curve as a mirror and a point as a light source on the Lorentzian spheres. The light rays, emitted from a point light source, reflected by this mirror curve form a curve called as pseudo spherical orthotomic curve. This curve has an envelop and this envelope is called caustic curve of the given mirror curve. In this study, we give a mathematical formula of these curves and examine the singularities of these curves by using the Sabban frame apparatus. At the end of this study, we give visual examples of these curves on Lorentzian spheres by using the Mathematica program.

Keyword: Pseudo sphere, orthotomic curve, caustic curve.


References


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THE FERMI-WALKER DERIVATIVE ALONG THE TANGENT INDICATRIX WITH THE ALTERNATIVE MOVING FRAME

Fatma Karakus

ABSTRACT. In this study we have investigated the Fermi-Walker derivative along the tangent indicatrix of any curve with the alternative moving frame in Euclidean space. Fermi-Walker termed Darboux vector is defined throughout the tangent indicatrix of the curve. The conditions for being Fermi-Walker parallel of any vector field have been analyzed along the tangent indicatrix of the curve with the alternative moving frame.

Blasche frame is used as a non-rotating frame in the space motions. In this study, the non-rotating frames have been explained with Fermi-Walker derivative along the tangent indicatrix of any curve. Then, the technical applications of the non-rotating frames have been investigated along the tangent indicatrix. We have examined the alternative moving frame whether it is a non-rotating frame or not. It is shown that while the curve is a helix the alternative moving frame is a non-rotating frame along the tangent indicatrix.


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The Fermi-Walker Derivative on the Tangent Indicatrix of Spacelike Curve

Fatma Karakus

Abstract. In this study, we have investigated the Fermi-Walker derivative along the tangent indicatrix of any spacelike curve with a spacelike or timelike principal normal in Minkowski 3-space. Fermi-Walker parallelism and non-rotating frame concepts are defined throughout the tangent indicatrix of any spacelike curve. It is shown that while any vector field is Fermi-Walker parallel along the tangent indicatrix of the spacelike curve the vector field is not Fermi-Walker parallel along the spacelike curve. We have examined the Frenet frame whether it is a non-rotating frame or not. We have proved that Frenet frame is a non-rotating frame along the tangent indicatrix of the curve.

Keyword: Fermi-Walker derivative, Fermi-Walker parallelism, Non-rotating frame, Spacelike curve, Tangent indicatrix.


References


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Almost Kenmotsu Pseudometric Structures on Indefinite Finsler Manifolds

A. Funda Saglamer \(^1\) Nesrin Caliskan \(^2\) and Nurten Kilic \(^3\)

Abstract. Almost Kenmotsu pseudo-metric structures on indefinite Finsler manifolds are introduced on horizontal and vertical Finsler bundles via pseudo-Finsler metric reduced to Sasaki-Finsler metric on diffusions.

Keywords: Almost Kenmotsu pseudo-metric structure, indefinite Finsler manifold, vector bundle.


References


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\(^{3}\)Dumlupınar University, 43100, Kütahya, Turkey, nurten.kilic@dpu.edu.tr
CONTACT LORENTZIAN STRUCTURES ON INDEFINITE FINSLER MANIFOLDS

A. Funda Saglamer 1 Nesrin Caliskan 2 and Nurten Kilic 3

ABSTRACT. Contact Lorentzian structures on indefinite Finsler manifolds are introduced. In detail, Lorentzian Finsler metric derived from the Finsler function is defined on vertical and horizontal vector bundles and basic structures like Finsler connection, Finsler tensor field, h-covariant and v-covariant differential operators theoretically obtained.

Keywords: contact Lorentzian structure, indefinite Finsler manifold, vector bundle.


REFERENCES


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On The Group of Isometries of The Generalized Taxicab Plane
Harun Barış Çolakoğlu

Abstract. In this study, first we present the notions of gt-radian, gt-reflection and gt-rotation in the generalized taxicab plane as natural generalized taxicab versions of radian, reflection and rotation notions of the Euclidean plane. Then, using the notions of gt-reflection and gt-rotation we determine the isometries of the generalized taxicab plane. Finally, we determine the group of isometries of the generalized taxicab plane in terms of the gt-reflection and gt-rotation.

Keyword: the generalized taxicab metric, gt-reflection, gt-rotation, isometry.

This work was supported by Research Fund of Akdeniz University. Project Number: 3725.

References

On Solutions to the Elliptic Quaternion Matrix Equation $AX = B$

Hidayet Huda Kosal

ABSTRACT. In this paper, the existence of solution to elliptic quaternion matrix equations $AX = B$ is characterized and solutions of these matrix equations are derived by means of real representations. Elliptic quaternions are generalized form of commutative quaternions, real and complex numbers. Thus, the obtained results extend, generalize and complement some known matrix theory results from the literature.

Keyword: Elliptic quaternion, real representation of elliptic quaternion matrix.

AMS 2010: 15B33, 15A18.

REFERENCES


1Sakarya University, Sakarya, TURKEY, hhkosal@sakarya.edu.tr
Abstract. In this study, we consider the studies related to the rotational motion with constant angular velocity of a test particle on the unit 2-sphere $S^2_1$ in semi Euclidean 3-space with index one, $E^3_1$. Firstly, we examine the spherical rotation of a vector with respect to a rotation angle and the unit vector along the axis of rotation. Then we search matrix and quaternion representations of a rotation. Secondly, we examine some properties of a map between the tangent vector space so(2,1) of special orthogonal group SO(2,1) and the tangent sphere bundle of 2-sphere $T_1S^2_1$ in $E^3_1$ and then we have examined whether this map which is defined from tangent sphere bundle with Sasaki semi Riemann metric to the special orthogonal groups with metric $h$ derived by the Killing form is isometry. Thirdly, we research a system of differential equations given by geodesics of Riemann manifold $(T_1S^2_1, g^S)$. Moreover, we study the Euler motion of any test particle on $S^2_1$, which determines geodesics of SO(2,1). Finally, we obtain a system of differential equations which gives geodesics of Riemann spaces (SO(2,1), h) with $(T_1S^2_1, g^S)$ by using rotation matrices is equal to a system of differential equations which gives geodesics of $(T_1S^2_1, g^S)$.

Keyword: Tangent sphere bundle; Rotational Group in Minkowski 3-space; Geodesic.


REFERENCES


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CIRCLING-POINT CURVE IN MINKOWSKI PLANE

Kemal Eren 1 and Soley Ersoy 2

Abstract. The purpose of this paper is to study the circling-point curve and its degenerate cases at the initial position of Minkowski plane. The first part of the paper is devoted to the determination Bottema’s instantaneous invariants and trajectory of origin with respect to these invariants in Minkowski plane. The intersection points of the circling-point curve and inflection curve are called Ball points. Here the number and also the geometric location of Ball points in Minkowski plane have been determined. The fundamental geometric property of the trajectory of each point in a plane is its curvature function $\kappa$. Under consideration $\kappa = \kappa' = \kappa'' = 0$, the existence conditions of Ball points in Minkowski plane have been given.

Keyword: Circling-point curve, Ball point, Instantaneous Invariants, Burmester Theory, Minkowski plane.

AMS 2010: 53A10, 53B30, 53C42.

References


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ASSOCIATED CURVES OF A GENERAL HELIX WITH $|\kappa| = |\tau|$ IN MINKOWSKI 3-SPACE

Kazım İlarslan

Abstract. General helices with curvature conditions $|\kappa| = |\tau|$ in Minkowski 3-space are studied in [1-3]. In this talk, we consider associated curves of a general helix with $|\kappa| = |\tau|$ and we obtain some results for these curves.

Keyword: General helix, associated curve, Minkowski 3-space.


References


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ON RULED SURFACES WHICH GENERATED FROM SPLIT QUATERNION PRODUCT OF TWO SPACE CURVES

Kıvanç Karakaş ¹, Bülent Altunkaya ² and Levent Kula ³

ABSTRACT. In this work, we investigate ruled surfaces in Minkowski space which generated from the split quaternion product of a line and a special space curve. Moreover, we give some examples for the split quaternion ruled surfaces by Mathematica 10.

Keyword: regle surface, split quaternion.
AMS 2010: 53A04, 53C50.

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**Some Characterizations for the Natural Lift Curve in Dual Lorentzian Space**

Mustafa Çalışkan, Sibel Paşalı Atmaca, and Emel Karaca

**Abstract.** In this study, we have given Frenet vector fields, curvature and torsion of the natural lift curve of a given curve by using dual angle between Darboux vector field and the binormal vector in dual Lorentzian space. We present the relationship of Frenet frame of the natural lift curve between Euclidean space and dual Lorentzian space.

Keyword: Natural lift, curvature, Frenet frame, torsion.


**References**


Some Notes Concerning Riemannian Submersions and Riemannian Homogeneous Spaces

Mehmet Gülbahar ¹, Erol Kılıç ² and Sadık Keleș ³

Abstract. Riemannian submersions between Lie groups and Riemannian homogeneous spaces are investigated. With the help of connections, some characterizations dealing these spaces are obtained.

Keyword: Lie group, Riemannian homogeneous space, Riemann submersion.


References


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Generalization of Sliced Almost Contact Manifolds

Mehmet Gumus 1, Çetin Camci 2

Abstract. In this work we introduce \( A - \text{constructed} \) Sasaki manifolds as a wider class of Sasaki manifolds which are studied in the 20th century widely in mathematics. We define and give examples of \( A - \text{constructed} \) contact metric manifolds and \( A - \text{constructed} \) Sasaki manifolds. Finally, we prove the theorems of necessary and sufficient conditions of being \( A - \text{constructed} \) Sasaki manifolds; we give the examples and theorems of the \( A - \text{constructed} \) Sasaki manifolds.

Keyword: Contact manifolds, Sasaki manifolds, Sliced almost contact manifolds.

References


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Hybrid Numbers and Some Applications

Mustafa Özdemir

Abstract. In this study, we define a new non-commutative number system called hybrid numbers. A hybrid number is a number created with any union of the complex, hyperbolic and dual numbers satisfying the relation $ih = -hi = i + \varepsilon$. Any 2x2 real matrix can be classified using hybrid numbers. In this paper, we examine De Moivre’s formula for hybrid numbers and give some applications in the matrix algebra.

Keyword: Hybrid Number, Dual Number, Hyperbolic Number, Complex Number, Generalized Complex Number.


References


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A Note on Quasi-Sasakian Structures on Nilpotent Lie Algebras

Mehmet Solgun

Abstract. It is known that there are nine non-isomorphic five dimensional nilpotent Lie algebras. On the other hand, one can obtain an almost contact metric structure on a Lie algebra from the left invariant almost contact metric structure of its Lie group. There is a classification of almost contact metric structures due to the covariant derivative of the fundamental 2-form. In this paper, we study the existence of the class of quasi-Sasakian structures on five dimensional nilpotent Lie algebras and examine the classes of left invariant quasi-Sasakian structures on the corresponding Lie group. Also, subclasses of quasi-Sasakian structures are investigated for some certain classes.

Keyword: 5-dimensional nilpotent Lie algebra, almost contact metric structure, quasi-Sasakian structure.

AMS 2010: Firstly, Secondly.

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ON THE MATRIX ALGEBRA OF ELLIPTIC BIQUATERNIONS
Murat Tosun ¹ and Kahraman Esen Özen ²

ABSTRACT. In this study, some basic topics on elliptic biquaternion matrices such as generalized inverses, eigenvalues and eigenvectors, determinants and similarity are discussed with the aid of the elliptic matrix representations of elliptic biquaternion matrices. Also, various results on these topics, which are important tools for developing matrix analysis over the elliptic biquaternion algebra, are obtained.

Keyword: Matrices of elliptic biquaternions, Generalized inverses, Determinants, Eigenvalues and eigenvectors.
AMS 2010: 15B33, 15A09.

REFERENCES

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Abstract. In this study, we show that the elliptic biquaternion algebra is algebraically isomorphic to the $2 \times 2$ total elliptic matrix algebra and so, we get a faithful $2 \times 2$ elliptic matrix representation of an elliptic biquaternion. Afterwards, we discuss similarity and generalized inverses of the elliptic biquaternions by means of these matrix representations and establish universal similarity factorization equality (or for short USFE) for elliptic biquaternions. Additionally, elliptic matrix representations of elliptic biquaternion matrices are obtained and some topics on elliptic biquaternion matrices are investigated by using these elliptic matrix representations. Also, aforementioned USFE is extended for elliptic biquaternion matrices.

Keyword: Elliptic biquaternion, Matrix representation, Universal similarity factorization equality, Generalized inverse.


References


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ON THE GAUSS MAP OF A CLASS OF HYPERSURFACES IN $\mathbb{H}^4$

Nurettin Cenk Turgay $^1$ and Erhan Güler $^2$

Abstract. Consider an isometric immersion $f : (\Omega, g) \hookrightarrow \mathbb{H}^4$ and let $M = f(\Omega)$, where $\Omega$ is an open subset of $\mathbb{R}^3$ and $g$ is a Riemannian metric. Let $G$ be the (hyperbolic) Gauss map of $M$ and $L_k$ denote the differential operator given by $L_k g = \text{div} P_k (\nabla g)$, $g \in C^\infty (M)$ for $k = 0, 1, 2$, where $P_k$ is the $k$-th Newton transformation of the normal bundle of $M$. $G$ is said to be $L_k$-pointwise 1-type if the equation $L_k G = f(G + C)$ is satisfied for a constant vector $C \in \mathbb{R}^5$ and $f \in C^\infty (M)$.

In this work, we study some classes of hypersurfaces in $\mathbb{H}^4$ in terms of having $L_k$-pointwise 1-type Gauss map. We obtain some classification results on this direction.

Keyword: CMC hypersurfaces, Cheng-Yau operator, $L_k$ operator, Gauss map.

AMS 2010: 53A35(Primary); 53C42.

References


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$^2$Bartın University, Faculty of Sciences, Department of Mathematics, 74100 Bartın, Turkey, ergler@gmail.com, eguler@bartin.edu.tr
ON INTEGRABILITY OF SEMI-ININVARIANT SUBMANIFOLDS OF TRANS-SASAKIAN FINSLER MANIFOLDS

Nesrin Caliskan 1 A. Funda Saglamer 2 and Nurten Kilic 3

ABSTRACT. In this study, integrability conditions of the distributions on semi-invariant submanifolds of trans-Sasakian Finsler manifolds are obtained.

Keywords: Trans-Sasakian Finsler manifold, semi-invariant submanifold

REFERENCES


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ON SOME CURVATURE PROPERTIES OF KENMOTSU FINSLER STRUCTURES ON VECTOR BUNDLES

Nesrin Caliskan 1 A. Funda Saglamer 2 and Nurten Kilic 3

ABSTRACT. The purpose of the present paper is to define Kenmotsu Finsler structures on $M'$ and to study its several properties where the base space $M^{2n+1}$ is a smooth manifold, $F^{2n+1} = (M, M', F)$ is a Finsler manifold and $F$ is the fundamental function. In particular, the relations between some basic curvature tensors of Kenmotsu Finsler manifolds on the vector bundles are discussed.
Keywords: Kenmotsu Finsler structure, vector bundle.

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(ε)-Almost Contact Metric Structures on Indefinite Finsler Manifolds

Nurten Kilic ¹, A. Funda Saglamer ² and Nesrin Caliskan ³

Abstract. (ε) – almost contact metric structures on indefinite Finsler manifolds are introduced. Some conditions for integrability of these structures are discussed on difusions.

Keywords: (ε)-Almost Contact metric Structure, indefinite Finsler manifold, vector bundle


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Almost \( K \)-Contact Pseudo-metric Structures on Indefinite Finsler Manifolds

Nurten Kilic \(^1\) A. Funda Saglamer \(^2\) and Nesrin Caliskan \(^3\)

Abstract. Almost \( K \)-contact pseudo-metric structures on indefinite Finsler manifolds are introduced. Horizontal and vertical flag curvatures for \( K \)-contact pseudo-metric Finsler structures on vector bundles are studied. Also the constant curvature of locally symmetric type of these structures are computed.

Keywords: almost \( K \)-contact pseudo-metric structure, indefinite Finsler manifold


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Classification of Conformal Surfaces of Revolution in Hyperbolic 3-Space

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Abstract. We research in this study conformal surfaces of revolution in hyperbolic 3-space $\mathbb{H}^3(-c^2)$. Additionally, we classify these surfaces providing different algebraic equations according to the coordinate functions and the Laplacian operators with respect to three sequential fundamental forms of the surface. Finally we get explicit forms of these surfaces.

Keyword: Conformal surfaces of revolution, Laplacian operator, hyperbolic 3-space.

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Helicoidal Surfaces Which has the Timelike Axis in Minkowski Space with Density

Önder Gökmen Yıldız ¹, Mahmut Ergüt ² and Mahmut Akyiğit ³

Abstract. In this paper, we study the prescribed curvature problem in manifold with density. We consider the Minkowski 3-space with a positive density function. For a given plane curve and an axis in the plane in Minkowski 3-space, a helicoidal surface can be constructed by the plane curve under helicoidal motions around the axis. There exist four kinds of helicoidal surfaces in $\mathbb{R}^3_1$ which are defined by Beneki [2]. We consider helicoidal surface which has the timelike axis of revolution and the profile curve lies in the $x_1x_2-$plane. Then we construct the helicoidal surface in $\mathbb{R}^3_1$ with density by solving the second-order non linear ordinary differential equation with the weighted curvatures. Keyword: Minkowski space, manifold with density, weighted curvature, helicoidal.

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AN OPTIMAL INEQUALITY FOR SUBMANIFOLDS OF AN INDEFINITE SPACE FORM

Rıfat Güneş 1, Mehmet Gülbahar 2, Sadık Keleş 3 and Erol Kılıç 4

ABSTRACT. An optimal inequality involving the scalar curvature for pseudo Riemannian submanifolds are proved and equality case of this inequality is discussed. This result is studied for submanifolds of various indefinite contact space forms.


Acknowledgements: This work is supported by İnönü University Scientific Research Coordination Unit with project number 1338.

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ON ISOMETRIC IMMERSIONS INTO EUCLIDEAN 5-SPACE WITH PARALLEL NORMALIZED MEAN CURVATURE VECTOR FIELD

Rüya Yeğin Şen ¹ and Nurettin Cenk Turgay ²

Abstract. Let $(M^n, g)$, $(\tilde{M}^m, \tilde{g})$ be some Riemannian manifolds and $f : (M, g) \hookrightarrow (\tilde{M}, \tilde{g})$ be an isometric immersion. $f$ is said to have parallel normalized mean curvature vector (PNMCV) if the unit normal vector field along the mean curvature

$H_f = \frac{1}{n} \text{tr}_f \alpha_f$

is parallel along the normal bundle of $f$, where $\alpha_f$ denote the second fundamental form of $f$. On the other hand, $f$ is said to be biconservative if the fourth order partial differential equation

$m \text{grad}||H_f||^2 + 4\text{tr}(A_f^T \cdot H_f (\cdot)) + 4\text{tr}(\tilde{R}(\cdot, H_f) \cdot \cdot^T) = 0$

is satisfied, where $A_f$ and $\nabla^\perp$ denote the shape operator and normal connection of $f$ and $\tilde{R}$ denote the curvature tensor of $(\tilde{M}, \tilde{g})$, [2, 3, 4].

We recently obtained complete classification of biconservative isometric immersions with PNMCV into Euclidean 4-space $\mathbb{E}^4$ in [6]. In this talk, we would like to move this study into Euclidean 5-space. We obtain shape operators of biconservative isometric immersions with PNMCV into $\mathbb{E}^5$. Consequently, we get regularity conditions for some cases. We also present some new explicit examples of biconservative submanifolds. In particular, we extend the classification result obtained in [1].

Keyword: Biconservative immersions, Parallel normalized mean curvature vector, Biharmonic submanifolds.

AMS 2010: 53B25(Primary); 53C40, 53A35.

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Some Remarks on Submanifolds of Ricci Solitons

Şemsi Eken Meriç ¹ and Erol Kılıç ²

Abstract. In the present paper, we consider a submanifold of a Riemannian manifold admitting a Ricci soliton. We study under which conditions such a submanifold is Einstein. Also, we give the relation between the scalar and mean curvatures of the submanifold of a Ricci soliton.

Keyword: Riemannian manifold, Ricci soliton, submanifold.

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A Study on Duality of Minimal and Maximal Surfaces

Seher Kaya 1

Abstract. There is a correspondence, known as duality, between minimal surfaces in Euclidean space $\mathbb{E}^3$ and maximal surfaces in Lorentz-Minkowski space $\mathbb{L}^3$ which assigns a maximal surface to each minimal surface. We study on the duality between rotational minimal and maximal surfaces by using isotropic curve. For this we have established two maps

$♭: \text{Min} \rightarrow \text{Max}$, $♯: \text{Max} \rightarrow \text{Min}$.

Then the surface $M♭$ (or $M♯$) is called the dual surface of $M$. We will show that dual surface of a catenoid in $\mathbb{L}^3$ with spacelike or timelike axis is the Euclidean catenoid with same rotational axis and dual surface of the parabolic catenoid with lightlike axis is the Enneper surface. Also, we will show that the dual surfaces of one-parametric family of Euclidean catenoids belong to the family of Bonnet surfaces in $\mathbb{L}^3$.

This talk is a part of the paper [6] which is a joint work with Rafael López.

Keyword: minimal surface, maximal surface, Björling problem.

References


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ON SLANT SURFACES OF LOCALLY PRODUCT RIEMANN MANIFOLDS

Sadık Keleş ¹, Erol Kılıç ² and Mehmet Gülbañar ³

ABSTRACT. Slant surfaces of a Riemannian and locally product manifolds are investigated. A relation involving the squared mean curvature and the Gauss curvature of pointwise slant surface of a locally product manifold is presented. Two examples of proper pointwise slant surfaces of a locally product manifold are given.

Keyword: Curvature, Riemannian product manifold, submanifold.
AMS 2010: 53C15, 53C40, 53C42.

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Abstract. In 1962, Bézier curves was studied by the French engineer Pierre Bézier, who used them to design automobile bodies. But the study of these curves was first developed in 1959 by mathematician Paul de Casteljau using de Casteljau’s algorithm, a numerically stable method to evaluate Bézier curves. A Bézier curve is frequently used in computer graphics and related fields, in vector graphics, used in animation as a tool to control motion. In this study we will work on Frenet-Serret vector fields and the curvatures of cubic Bézier curves in Euclidean-3 space $E^3$.

Keyword: Associated curves, Bertrand curve, Mannheim curve

References


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AN EXAMINATION ON $N - T^*B^*$ CURVES IN $E^3$

Şeyda Kılıçoglou ¹ and Süleyman Şenyurt ²

Abstract. Deriving a curve based on the other curve is a well known method in differential geometry. Evolute and involute curve, Mannheim curves and also Bertrand curves are given as the famous examples. Before we have examined $ND^*$ curve with common principal normal vector of the first curve and Darboux vector of the second curve are linearly dependent. In this paper, we have defined and examined $N - T^*B^*$ curve with the principal normal vector of the first curve and any $R^*(s) = a(s)T^*(s) + b(s)B^*(s)$ vector which lies on the normal plane of the second curve are linearly dependent. As a result, these new curves are called as $N - T^*B^*$ curves. Also, we give Frenet apparatus of the second curve based on the Frenet apparatus of the first curve.

Keywords: Associated curves, involute curves, Bertrand curves, Mannheim curves.

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AN EXAMINATION ON NP∗ CURVES IN E³

Şeyda Kılıçgöl 1

ABSTRACT. The evolute and involute curves, Mannheim curves or Bertrand curves are the famous examples of the associated curve pairs. In the view of such information we have examined ND∗–curve pairs where the principal normal vector of the first curve and Darboux vector of the second curve are linearly dependent. Moreover, we have defined new curve pairs where the principal normal vector of the first curve and the vector $P^*(s) = a(s)N^*(s) + b(s)B^*(s)$ lying on the normal plane of the second curve are linearly dependent. We have called these curve pairs NP∗–curves. Also, while the examination of NP∗–curves we obtain some relations for the curvatures and Frenet apparatus of the second curve based on the Frenet apparatus of the first curve.

Keywords: Associated curves, involute curves, Bertrand curves, Mannheim curves.

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Abstract. The main idea is to show that constant angle surfaces in $\mathbb{H}^2 \times \mathbb{R}$ can be obtained by split quaternion product and the matrix representations.

Keyword: Constant angle surfaces, product manifold, split quaternions.

References


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Abstract. In this paper we study surfaces in $S^2 \times \mathbb{R}$ for which the unit normal makes a constant angle with the $\mathbb{R}$-direction. The main idea is to show that constant angle surfaces in $S^2 \times \mathbb{R}$ can be obtained by quaternion product and the matrix representations. Keyword: Constant angle surfaces, product manifold, quaternions. AMS 2010: 53B25.

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Some Properties of Holditch Type Theorem for Kinetic Energy of Projective Curve Under the 1-parameter Spatial Homothetic Motion

Serdar Soylu ¹, Onder Sener ² and Ayhan Tutar ³

Abstract. In this study, under the homothetic direct and inverse motions. The kinetic energy of the projection curve is calculated. The Holditch theorem are obtained for the kinetic energy of the projection curve. And also some properties are given which fullfill these features.

Keyword: Holditch Theorem, Kinetic Energy, Kinematic

References


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Spinor Representations of Fibonacci Quaternions

Tulay Erisir ¹, Mehmet Ali Gungor ²

Abstract. In this paper, we study on spinors that are vectors with two complex components. Cartan firstly introduced spinors in [1] geometrically. Moreover, Vivarelli expressed some relations about spinors and real quaternions in [2]. In this study, we give a relationship between spinors and Fibonacci quaternions. Then, we express spinor representations of formulas given for Fibonacci quaternions. Finally, we prove some theorems using spinors for Fibonacci quaternions.

Keyword: Spinor, Fibonacci quaternion.

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Timelike Circular Surfaces in Minkowski 3-Space

Zeynep Çanakcı¹, O. Oğulcan Tuncer ², İsmail Gök ³, and Yusuf Yaylı⁴

ABSTRACT. In this study, we introduce timelike circular surfaces and timelike roller coaster surfaces in Minkowski 3-space. We investigate some geometric properties such as striction curves, singularities, Gaussian and mean curvatures. Furthermore, we obtain the conditions for timelike roller coaster surfaces to be flat or minimal surfaces. Then, we obtain split quaternionic and matrix representations of timelike circular surfaces and timelike roller coaster surfaces. Finally, we present some examples with figures.

Keyword: circular surface, striction curve, singularity, split quaternion.

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A GEOMETRIC VIEW OF MAGNETIC SURFACES AND MAGNETIC CURVES

Zehra Özdemir 1, İsmail Gök 2 and F. Nejat Ekmekci 3

ABSTRACT. In this study, we investigate the magnetic surfaces geometrically. We study the problem of constructing family of magnetic surfaces family whose members share the same magnetic field lines and magnetic curves. Moreover, we give the relation for trajectory of charged particles and these surfaces. In addition, we give some examples and illustrated their figures.

Keyword: Magnetic fields, Special curves and surfaces.
AMS 2010: 76X05, 53A04, 65D17.

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GEOMETRIC INTERPRETATION OF NULL POINTS

Zehra Özdemir ¹

ABSTRACT. The point of intersection of two directional loci called as null point. The spine curve can be amplified and twisted near the null point. These influences lead to topological changes.

In this work, we have studied the null points with a geometric point of view and gave some visual examples.

Keyword: Magnetic fields, special curves and surfaces, null point.
AMS 2010: 76X05, 53A04, 65D17.

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MATHEMATICS
EDUCATION
Mathematics Education Organization and Curriculum Development in Line with the Trends of Sustainable Development: Experience from University in Latvia

Anna Vintere ¹, Baiba Briede ²

Abstract. Integration of sustainable development into an educational system at all levels is an important challenge that has been encountered in recent years as universities have a particular responsibility and role to play by increasing students’ capacities to achieve sustainable futures embracing ecological, economic and social aspects of human existence. In accordance with different national and international documents targeting the Education for Sustainable Development (ESD) in each university’s programme has to include the knowledge, skills and values necessary for living responsibly and prosperously in a limited world. A particular attention should be paid to mathematics. In European Union documents mathematical competence is recognized as one of the most important competencies that people need to achieve their personal fulfilment, to be actively involved in civic and social life, and to successfully develop their professional careers in a knowledge society. Mathematics is also an instrument for sustainable development, because in mathematical activities (counting, measurement and location), people are developing ways to effectively meet their needs, indicating a clear link between people and the environment (UNESCO, 2017). It should be noted that in authors’ university many higher education courses are mathematics-intensive and students need a high level of competence in the subject. Those are conditions that have influenced the development of mathematical education at the Latvia University of Life Sciences and Technologies (LLU) in the last decade. In this article described mathematics studies organization in LLU, given short summary on the courses offered and presented conception of mathematics studies for engineering, technological and social sciences which include three aspects: how to teach (level of proofs or only algorithms for tasks solving), practical application and usage information communication technologies in mathematics studies.

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Abstract. (Continuation) The article reflects also the experience of LLU in initiatives to transform mathematics education into education for sustainable development that had been driven based on UNECE Strategy for ESD. Measurement for the implementation of this strategy in the mathematics education was made by four input indicators which determined by the objectives of the UNECE Strategy for ESD (UNECE, 2005): promoting sustainable development through formal, non-formal and informal education, equipping educators with the competence to include ESD in their teaching, teaching tools and materials and research on ESD. The main focus is on development of competence-based curriculum for educating for sustainability: determination of the content of the course and teaching methods based on constructivist approach to the teaching to develop mathematical competence and also boost competences needed for SD. Practical implication - the experience of LLU on the mathematics education organization and curriculum development in line with the trends of sustainable development can be used in development of other subjects.

Keyword: curriculum development, education for sustainable development, mathematics education organization, mathematical competence, sustainable development.

AMS 2010: Firstly, Secondly.

References


How Can We Use Philosophy of Mathematics in Mathematics Education: Preservice Mathematics Teachers’ Perspectives

Fatih Tas ¹, Yuksel Dede ²

Abstract. The philosophy of mathematics is the branch of philosophy whose task is to reflect on, and account for the nature of mathematics. This is a special case of the task of epistemology which is to account for human knowledge in general. The philosophy of mathematics addresses such questions as: What is the basis for mathematical knowledge? What is the nature of mathematical truth? What characterises the truths of mathematics? What is the justification for their assertion? Why are the truths of mathematics necessary truths? [1]. According to [2] there are broader interpretations of that go beyond the aims, rationale and basis for teaching mathematics. Expanded senses of the philosophy of mathematics education include: Philosophy applied to or of mathematics education, philosophy of mathematics applied to mathematics education or to education in general, philosophy of education applied to mathematics education. The aim of this study was to investigate the preservice mathematics teachers’ use philosophy of mathematics in mathematics education. In this research was used the case study method of qualitative research design. Preservice mathematics teachers who were studied in last years of Mathematics Education Undergraduate Program from a university which was stated in Black Sea Region North of Turkey participated the study. Participants had experienced micro teaching and were asked questions about philosophy of mathematics semi-structured interviews. Data will analyze with quantitative and qualitative methods were used. Further analysis of data is ongoing. The results will have presented in conference.

Keyword: Philosophy of Mathematics, Mathematics Education, Preservice Mathematics Teachers’.

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DETERMINING TENTH GRADE STUDENTS WAYS OF THINKING AND WAYS OF UNDERSTANDING ACCORDING TO DNR SYSTEM IN CONTEXT OF CIRCLE

Figen Uysal ¹, Gokhan Demir ²

Abstract. The DNR system, introduced by Harel [1], is a conceptual framework that deals with teaching and learning of mathematics. In this framework, Harel [1] introduces the triad of determinants, Mental Act-Ways of Understandings-Ways of Thinking, to analyse students acts of a particular mental act. The notions of way of understanding and way of thinking simply can be thought as two different categories of knowledge. Ways of understanding refer to products, such as definitions, conjectures, theorems, proofs, problems, and solutions, whereas ways of thinking refer to the mathematical practices used to create such products. Examples of ways of thinking include empirical reasoning, deductive reasoning, structural reasoning, heuristics, and beliefs about the nature of mathematical knowledge and the process of its acquisition [2]. The purpose of this study is to investigate tenth grade students’ ways of thinking and ways of understanding within the framework of DNR in the context of circle. In this qualitatively designed study, the data was collected through a focus group study with four high school students. They answered four circle problems designed by Harel and his friends [3]. The data was analysed qualitatively by using content analysis technique. Preliminary findings indicated that students used algebraic way of thinking as well as geometric way of thinking. Detailed results of the data analyses will present at the symposium.

Keyword: ways of thinking, ways of understanding, circle.

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Investigating the Proofs of Preservice Classroom Teachers in Geometry

Gulcin Oflaz

ABSTRACT. The aim of this research is to reveal the characteristic of proofs produced by preservice classroom teachers about triangles. So this qualitatively designed research is a case study. The participants of this study are 3 preservice classroom teachers. To reveal the characteristic of their proofs, a questionnaire including 3 proofs about the angles of triangles was prepared. Each preservice teacher was interviewed by the researcher so their proofs were investigated in depth. The data of this study consist of these interviews, which were recorded by video cameras and students answer sheets. The video records were transcribed and then both the video records and answer sheets were analyzed. It was seen that preservice teachers had difficulty in proving. While they produced partially correct and invalid proofs, they use external proof schemes.
Keyword: preservice classroom teachers, proving, geometry.
Cognitive Processes of Fourth Graders When Solving Non-Routine Problems

Gulcin Oflaz

Abstract. The aim of this research is to determine the cognitive processes of fourth graders in solving non-routine word problems. So this is a case study. A questionnaire containing non-routine word problems was prepared and applied to 45 fourth graders. According to their achievement in solving problems, 4 students were selected and interviewed by the researcher to analyze their solutions in depth. These interviews were recorded by video cameras. So the data of this study consist of students answer sheets and the video records. After transcribing the video records, both video records and answer sheets were analyzed. It was seen that students have difficulties in solving non-routine problems. While some students have great problem solving skills, others make mistakes and face difficulties in solving problems.

Keyword: non-routine problems, cognitive processes, fourth graders
EXAMINATION OF THE CROSS SECTION FINDING ACHIEVEMENTS OF PRE-SERVICE
MATH TEACHERS ACCORDING TO THE VARIOUS FACTORS

İsmet Ayhan 1, Osman Sinecen 2

ABSTRACT. The aim of this study was to examine the cross section finding achievement of pre-service math teachers according to some factors such as gender, class level, academic achievement, taking Analytic Geometry courses, note taking during Analytic Geometry courses. This study was carried out by the participation of 145 pre-service math teachers in Pamukkale University, Faculty of Education, Department of Mathematics Education. Santa Barbara Solids Test was administered to the participants. The results obtained from the analysis of survey data showed that there is a significant difference between the cross section finding achievement of 3rd grade students and 1st or 2nd grade students, but there is not a significant difference between the cross section finding achievement of 3rd grade students and 4th grade students. Moreover, there is not a significant difference the cross section finding achievement of pre-service math teachers according to both academic achievements and genders. Furthermore, there is not a significant difference the cross section finding achievement of pre-service math teacher who taken Analytic geometry courses according to note-taking during the course, genders, academic achievements.

Keyword: Santa Barbara Solid Test, The Cross Section Finding Achievement, Elementary Mathematics Pre-Service Teachers.
AMS 2010: 97D60, 97B50.

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INVESTIGATION OF HIGH SCHOOL STUDENT’S GENERATING EXAMPLE TYPES

Memet Kule 1, Bilge İnan 2, Nazan Sezen-Yüksel 3, Mert Yüce 4, Şenol Dost 5

Abstract. Mathematics curriculum primarily concentrates on mathematical concepts and their relations along with basic mathematical operations and mathematical meanings of these operations. Example generation any mathematical expressions is assumed to be one of the most effective way for students to understand their concepts. Example generation, one of the routines of everyday life, is also a comprehension activity widely used in mathematical education. In particular, there are some studies in the literature showing how effective example generation is at positively affecting learning abilities. The aim of this study is to examine example generation kinds that high school students come up with. The research is designed in a pattern of case studies from qualitative research patterns. The data of the study were collected through the working papers on sample production activities conducted on the high school students and the data on on the study papers were analyzed by means of content analysis. At the end of the research, it was determined which sample production type was most used by students. As a consequence, it was observed that high school students did not perform well in example generation activities in general and that they generally had a tendency to use the starting examples.

Keyword: example, example generation, example generation strategies, conceptual knowledge, procedural knowledge
AMS 2010: 97D50.

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Analysis of Meta-cognitive Skills and Van Hiele Levels of Geometric Thinking through Various Variables

Özgün Şefik ¹, Selin Urhan ², Nazan Sezen Yüksel ³

Abstract. One of the skills students require in order to cope with problems is meta-cognitive skills [1]. Meta-cognitive skills can be regarded as thinking skills that play active role not only in academic sense but also in determination of the route to be followed in daily life [2]. Flavell [3] defines metacognition as an individuals awareness of their own meta-cognitive processes including comprehension, self-monitoring, and being able to control them, and claimed that meta-cognitive skills are important factors in explaining success in problem solving. According to Fang and Cox [4], meta-cognitive skills include self-monitor of learning, being aware of learning process, planning and choosing strategies, monitoring learning process, correcting mistakes, controlling whether strategies work or not and change learning methods/strategies if necessary. On the other hand, Van Hiele Geometric Thinking Model presents, in addition to geometric thinking, how an individual perceives geometry. It was developed in accordance with plane geometry; however, it was applied to three-dimensional objects later on [5]. The aim of this study is to analyze meta-cognitive skills and Van Hiele levels of geometric thinking in the sense of various variables. 177 high-school and university students were included in the scope of study for this aim. The first result obtained from study is that meta-cognitive skills of high-school students differ depending on class level. On the other hand, meta-cognitive skills differ significantly depending on Van Hiele levels of geometric thinking. Moreover, this difference can be observed nearly at all levels. Also, it was concluded that meta-cognitive skills and Van Hiele levels of geometric thinking show significant differences depending on education level.

Keyword: Meta-cognitive skills, van hiele levels, geometric thinking.

References


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Abstract. One of the fundamental problems of mathematics education is about how to teach it. According to this, in recent years it is focused on what it means to have mathematical competence [1]. According to the notice published by National Research Council [8], it was stated that one of the mathematical competences is conceptual understanding. Conceptual understanding reflects reasoning skill of students including definition of the term, various representations, relations between terms [7]. Functions which is a concept of mathematics is included in mathematics education curriculum within the scope of set theory together with ordered pair definition of Bourbaki [1]. Multi-variable function which emerged as the generalization of functions that is one of the important concept of mathematics [4] is included in analysis courses at university programs. The common result which is obtained from studies of some groups such as Mathematical Association of America [MAA], National Council of Teachers of Mathematics [NCTM] is that analysis teaching is not effective through mathematics education [10]. APOS theory which is a learning theory in mathematics education analyzes mental structures formed by individuals in learning a mathematical concept and puts forward components in learning concept [3]. In order to determine mental structures and mechanisms about concepts in mathematics; a hypothetical model called genetic decomposition is used. In this study mental structures of students about graphic representation of two-variable functions were analyzed. For this aim, genetic decompositions about three-dimensional space and two-variable functions which was made in by Trigueros and Martinez-Planell [5], [6], [9] was studied. The study was carried out with six pre-service mathematics teachers who study at a state university in Ankara. Case study pattern which is one of the qualitative research methods was used in the study. Data of the study was obtained from two sources.

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Abstract. (Continuation) First of them is written answers of participants from Two-variable Functions-Conceptual Understanding Test; the other one is sound recordings obtained from clinical interviews about these questions. Data obtained from study were analyzed depending on APOS theory. According to the results, it is observed that although students who are yet in the process step of conceptual understanding of two-variable functions can determine the graphic function given in $\mathbb{R}^2$; they cannot generalize this situation to three-dimensional space for two-variable functions.

Keyword: Mathematics education, conceptual understanding, two-variable functions, geometrical representation, APOS theory.

References

THE EVALUATION AND CORRELATION OF THE STUDENTS’ ANXIETY AND THEIR SUCCESS IN MATH CLASSES

Suheeda Guray

ABSTRACT. In this study, we are evaluating the relationship between anxiety and success regarding math classes by measuring, through ”Mathematic Anxiety Scale”, the anxiety levels of first, second, and third grade public high schoolers for math classes. This study has been done on the students of 9-C, 10-F, 11-A classes of the 75. Year Anatolian Lyce. During the collection of data, the scale that has been used to measure the anxiety of students is Erol’s ”Math Anxiety Scale”. The collected data has been inspected by t-testing, analysis of variance and especially correlation analysis. The purpose of the analysis is a contrast and comparison of the math anxiety and the success of the students based on their grade levels.

The sample of this study is a total of 30 female, and 35 male ”75. Year Anatolian Lyce” students who are studying their spring semesters in the 9-C, 10-F, 11-A classes. The ”Math Anxiety Scale” has been implemented to 60 of these students.

The Math Anxiety scale, which has been implemented during this study, has a Cronbach Alpha coefficient of 0.91 (Yavuz, 2006). The scale consists of 45 questions, each question has 4 likert type answers. The highest attainable score is 180, whereas the lowest attainable score is 45. According to this standard, scores between 45-68 is considered to be low, 69-109 is normal, 109-128 is anxious, and 129-180 is very anxious (Erktin, Dönmez ve Özel, 2006).

The results of this study show that there is not a noticeable difference between the grade type and the anxiety levels. However, a correlation has been discovered between the anxiety levels and success rates of the students in general. Consequently, as a result of the conclusions that have been reached through the evaluation of this correlation, certain proposals have been developed.

Keyword: Math Anxiety Scale, Interest in Math, Public schools

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Analysis of the Math Anxiety levels in Students of Private Science Lycee and Public Anatolian Lycees

Suheda Guray

Abstract. The purpose of this study is to evaluate the sample of private school and Anatolian high school education classes by using Descriptive Factor Analysis of Math Anxiety and to determine sub dimensions of anxiety scale. In the research, the validity of Erol, 1989 and the “Mathematics Anxiety Scale”, which is accepted as trustworthiness, were used. Mathematical Anxiety Scale results are used to determine how the details of the "Anxiety" feature occur under the sample. (Tavşancıl, 2006). In the analysis of collected data, Explanatory Factor Analysis was used. The sample of the research; By using the accessible sampling method, a total of 63 students in the spring semester of the 75th year Anatolian High School in 2017/2018 Academic Year and a total of 58 students in the spring term of 2017/2018 Education in the special Ayesabla College constitute a total of 121 students. The Cronbach Alpha reliability coefficient of the Mathematics Anxiety Scale (CRS) used in this study was 0.91 (Yavuz, 2006). The scale consists of 45 questions. Each question is measured by 4-point likert type answer option. The highest possible score is 180 and the lowest score is 45. The scores of this scale were categorically 45-68 low, 69-108 normal, 109-128 anxious, 129-180 high anxiety (Erktin, Dönmez ve Özel, 2006). In the research data; school type class levels will be improved by sub-factors of anxiety by evaluating with Mathematics Anxiety Scale Factor Analysis.

Keyword: Mathematics Anxiety Level, Anxiety and Sub-factor

References


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Other Areas
SVMs Optimization by Tuning Parameters for Paraphrase Identification

Asli Eyecioglu 1

ABSTRACT. Support Vector Machines (SVMs) are widely used algorithms that are proven to be effective on most classification problems. One of the major challenges of SVMs is to decide on tuning the right parameters for the task in hand. The quality of the results are not only depends on training data but also on adjusting the model by tuning the parameters for the specified classification task.

This research explore optimization of the two core parameters of SVMs: Regularization parameter and gamma, in order to learn how adjustment of parameters effects the results are. Our method applies Grid Search and Random Search Algorithms in order for automated discovery of favourable parameters for binary classification. Experiments are conducted with both linear and Radial Basis Function (RBF) kernels on a paraphrase corpus.

Keyword: SVMs-optimization, SVMs parameters, paraphrase identification.

AMS 2010: Firstly, Secondly.

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Kinematic Calculations of a Sonar Device Developed Using Ultrasonic Sensor

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Abstract. Increasing the quality of the human computer interfaces developed with today’s technology, which contains the criteria of software and hardware architecture and organization, is an important issue. Regardless of the reasons for the motions, the calculation of the displacement of objects in the Euclidean space is part of the production and development process of microprocessor and microcontroller circuitry devices. It is a common process which performing kinematics calculations of circuit components separately and collectively for devices developed as a multi-component embedded system before serial generation begins.

In this work, a sonar device with mobile ultrasonic sensor, which can be controlled by telephone and PC, has been developed. The determination of the cross-sectional areas with the help of rotation and translation in the Euclidean space of the undefined objects entering the coverage area of the device has been carried out by kinematic calculations. The mobile sonar rotates 360 degrees around the object by performing angular movements at specified intervals when an object is seen. In this process, the rotation angle, the rotation axis, the distance to the object, and the images obtained from the object are calculated to determine the cross sectional area of the object by horizontal axis.

By comparing the obtained cross-sectional area value with the actual cross-sectional area measurement value, the relative error value is produced. The angular movements having the least error rate are encoded in the default angular value and loaded into the device. As the next work, 3D modeling of the existing structure and kinematic calculations for the determination of the volumes of the objects are planned. It is also aimed to utilize the Lorentz space characteristics in the determination of the blind spots that may occur in 3D modeling. in this context , comparing the calculations to be performed with the actual measured values will provide an important contribution to the literature.

Keyword: Kinematics, embedded systems, human computer interaction, image processing, mathematical software.
AMS 2010: 53A17, 68U10, 97N80.

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APPLICATION OF RANKING WITH SIMILARITY MEASURE IN MULTI CRITERIA DECISION MAKING

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ABSTRACT. The aim of this paper is to proposed an application multi criteria decision making in intuitionistic fuzzy sets. Multicriteria decision making is a well known concept that aims to select the best solution among several alternatives in decision making. In this paper; success ranking of schools has been researched in multi criteria decision making. Also the most successful school has been determined among these ranked schools. For this paper have been benefitted from similarity measure for intuitionistic fuzzy sets in multi criteria decision making problem. Each option have been compared with both the positive-ideal solution and the negative-ideal solution. This application could be used in situations that are not dependent on a single criterion.

Keyword: intuitionistic fuzzy sets, distance measure, decision making, multi criteria.

AMS 2010: 03E72.

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VERSATILE OPTIMIZATION OF PARKING SYSTEM DESIGN

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ABSTRACT. Today, the tasks that need to be accomplished can be divided into packages to bring the application modularly, especially in the process of the development of applications that have their own disciplines belonging to different disciplines. This not only facilitates the follow-up of work packages to be done, but also increases work efficiency. However, optimization of the system in general and in modules, especially in modular applications, is become forefront.

In this study, parking system design, automation and optimization were realized as an embedded system. Entrance to the parking lot is only authorized. This authorization is limited to a fingerprint and a password entered by touching the touch pad. The password is based on the determination and follow-up of the time between consecutive touches. There is a database recording system in the automation which can access general information about the usage of the parking lot, such as which vehicle entered and stayed in the parking lot and how many parking spaces were left in the parking lot. With this automation, free fields in the parking lot can be transmitted as messages to the users’ mobile phones optionally.

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ABSTRACT. (Continuation) The comparison of different options such as rectangular or oval/circular design of the parking lot is within the scope of study. Construction costs such as concrete, iron, workmanship and time that can be used for these designs have also been compared. The number of vehicles that can enter the parking lot calculated according to the design features of the parking lot; the size of the vehicles using the parking lot, the turning diameters and the angular positions of the doors of the vehicles in the open position affect other vehicles. Kinematic calculations have been made to use the surface area of the parking lot at maximum level. The entire system is modeled as 3D and the interaction resulting from the collision of objects is calculated. The modules in the study are optimized both for the separately and for the overall cost as a whole.

The results obtained from this study reveal the importance of optimization, especially in modular and multidisciplinary studies.

Keyword: Embedded systems, optimization, angular position, human computer interaction, 3D modeling, kinematics.

AMS 2010: 53A17, 46N10, 00A71.
A NEW WAY TO DETERMINE COMMON SET OF WEIGHTS FOR FULL RANK OF PERFORMANCE OF DECISION MAKING UNITS

Ihsan Alp 1

ABSTRACT. Traditional Data Envelopment Analysis (DEA) models select weights specific for every DMUs in a way that they maximize the performance of each Decision Making Unit (DMU). With the DEA models, the inputs and outputs of each DMU are evaluated with the different set of weights that are not common. Importances of weights of the inputs and outputs not to happen same for every DMU. This is advantageous for some DMUs, while for other DMUs it is disadvantageous. Another drawback is that in the DEA performance calculations, for some inputs and outputs, it selects very small or zero weights. A very small near zero or zero weight probably means that an important criterion will not be considered in performance calculation. Together with above, another defect is the same efficiency score (1/100) given to efficient DMUs. This prevents full ranking of DMUs.

One way for eliminate the disadvantages which mentioned above is to use same set of weights during calculation of the performance of all DMUs. The weights of the Andersen-Petersen super efficiency model were used as jumpstones in this new Common Set of Weights (CSWs) generation algorithm. This new algorithm will be apply to the well-known data of a real-world problem in literature. Keyword: Data Envelopment Analysis, Common Set of Weights, Performans, Andersen-Petersens Super Efficiency Model.

Keyword: Data Envelopment Analysis, Common Set of Weights, Performans, Andersen-Petersens Super Efficiency Model.

AMS 2010: 90B99, 90-08.

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Some Properties of Poly-$p$-Bernoulli Numbers

Levent Kargin

Abstract. We relate geometric polynomials and poly-$p$-Bernoulli polynomials with an iterated integral representation, then discuss several properties of poly-$p$-Bernoulli polynomials and numbers. In some special cases, we obtain some new results for poly-Bernoulli polynomials and numbers.

Keyword: Geometric polynomials, poly-Bernoulli polynomials.
AMS 2010: 11B68, 11B75.

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Fault Diagnosis in Induction Motors by Using Common Vector Approach

Sefa Bulut ¹ and M. Bilginer Gülmezoğlu ²

Abstract. Induction motors are widely used in industrial applications by the reason of their robust structure, efficiency and low cost. Since, faults on these motors may influence the whole process in operation, early detection of these faults has great importance. In this study, bearing fault diagnosis in induction motors are investigated. Current [1,2], vibration [3,4] and acoustic emission [5] signals are widely used for bearing fault diagnosis. In this study, vibration signals are used for bearing fault diagnosis in induction motors because of the capability of early diagnosis. The database used in the presented study consists of vibration signals collected from ball bearings of induction motor operated at no load for normal, and three faulty conditions which are inner race fault, outer race fault and ball fault. Therefore, four classes problem for fault diagnosis is considered in this study. For fault diagnosis, firstly features are extracted, then these features are applied to Common Vector Approach (CVA) [6,7]. Two different feature vector groups are constructed in order to diagnose the bearing faults. First feature vector group is constructed by calculating statistical parameters in time and frequency domain. Second feature vector group is constructed by using Empirical Mode Decomposition (EMD). The recognition rate of 96.25% and recognition rate of 85.42% are obtained for time and frequency domain statistical parameters and EMD parameters respectively.

Keywords: Fault diagnosis, induction motor, pattern recognition

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An Application of Intuitionistic Fuzzy TOPSIS on Information Technology Planning Problem

Sezin Guleryuz 1

Abstract. In complex situations such as fuzziness in Decision Makers (DMs) judgments or the lack of knowledge about the problem, Intuitionistic Fuzzy Sets (IFS) are utilized to eliminate uncertainty and to better represent DMs preferences. In most of the researches, the vagueness of Multi Criteria Decision Making (MCDM) is considered with fuzzy set theory, by only assigning degree of membership. However IFS is a powerful method to cope with uncertainty by taking both degree of membership, non-membership function and hesitancy degree. This study presents an effective new evaluation model with Group Decision Making (GDM) based MCDM framework for information planning. The originality of the paper comes from its ability to provide an effective evaluation model of Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) with IFS. For demonstrating the potential of this model a real case study is given to select the most appropriate computer hardware for customers.

Keyword: Multi Criteria Decision Making, TOPSIS, Information Technology, Intuitionistic Fuzzy Sets

AMS 2010: Firstly, Secondly.

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Quantum Correlations and Quantum Coherence

Shao-Ming Fei

Abstract. Quantum correlations and quantum coherence play significant roles in quantum information processing such as quantum communication and computation. The operational characterization of quantum correlations and quantum coherence are also the important aspects of the corresponding resource theory. We introduce some recent results on the theory of quantum entanglement; coherence quantifier based on max-relative entropy and its implications to subchannel discriminations; general operational one-to-one mapping between coherence measures and entanglement measures; as well as the related quantum uncertainty relations and particle-wave duality.

References


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ANALYTICAL SOLUTIONS OF SCHRÖDINGER EQUATION

Henryk A. Witek

ABSTRACT. Modern quantum mechanical treatment of atoms and molecules is based on approximate numerical solutions to Schrödinger equation. The resulting computational techniques are quite successful allowing for interpretation and prediction of various experimental investigations, but because of their approximate character, they often yield results with substantial numerical errors. In the current talk, I review recent progress in the development of analytical tools for quantum mechanical treatment of atoms [1-5] and molecules, with particular attention to the analytical treatment of the Schrödinger equation for a two-electron atom as developed in our group. [6,7]

Keyword: Schrödinger equation, analytical solution of PDEs, quantum mechanics, special functions, mathematical physics.
AMS 2010: 35Q40, 70F07, 81V45, 33C90.

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Molecule Dynamics Simulations on Domain Structure Evolution in BaTiO3 Thin Film

Xinhua Yang ¹, Lang Yao ², Di Peng ³

Abstract. Due to their excellent mechanical and electric coupling characteristics, ferroelectric materials are widely applied in aviation, automobile, and medicine industries as sensors, actuators, and transducers. With miniaturization of ferroelectric devices to micrometer or even nanometer scale, some novel phenomena were found, so that it is known that nanoscale polarization domain structures often exhibit some special configurations and evolution behaviors. Combined with the core-shell model, the molecular dynamics method was used to simulate polarization domain evolution in a BaTiO3 single crystal thin film under compression strain loading, and the domain configurations and evolution behaviors were investigated for different initial thicknesses of stripe domains and different orientations of domain walls. The toroid moment was employed to describe evolution of polarization domain configuration. Both their polarization and toroid moment histories were tracked and the polarization configurations corresponding different strains were also recorded. It was found that the vortex and anti-vortex arrayed configuration can appear for all the cases but the difference lies in the following. For the 90-degree domain walls, due to pinning from the domain walls, the stripe domain is stable and there is no mutation occurring in the curves of the toroid moment with the strain. For the 180-degree stripe domain walls, when the strain loading is parallel to the domain walls, the domain structure is not always very stable and there are mutations occurring in the curves of the toroid moment with the strain. When the strain loading is perpendicular to the domain walls, however, the domain wall can pin the vortex configurations so that the domain structure is also very stable. These results can be helpful for designing some novel ferroelectric devices.

Keyword: BaTiO3; shell model; molecular dynamics simulations; toroid moment; polarization

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Cubic Rank Transmuted Generalized Gompertz Distribution

Caner Tanış ¹, and Buğra SARACOĞLU ²

Abstract. In this study, a new statistical distribution called as “Cubic rank transmuted Generalized Gompertz” is introduced. Some statistical properties of this new distribution are examined. Also the maximum likelihood, least squares and maximum product of spacing estimators of the unknown parameters of this new distribution are obtained. Further, a Monte-Carlo simulation study is performed to compare the performances of these estimators according to mean square errors. Finally a real data application is performed to show that this new model have a place in real life.

Keyword: Cubic Rank Transmuted Generalized Gompertz Distribution, Maximum Likelihood Estimation, Least Square Estimation, Maximum Product of Spacing Estimation, Monte-Carlo Simulation Study

AMS 2010: 62F25, 62N01, 62N05.

References


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DUS-Burr Distribution and its Properties

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Abstract. The Burr-XII distribution was introduced by Burr (1942) and it has been received more attention by the researchers due to its broad applications in different fields including the area of reliability and actuarial Risk analysis. In this paper, a new lifetime distribution called DUS-Burr-XII is introduced by using DUS transformation (which is recently introduced by Kumar et al. (2015)) on Burr-XII distribution. The mean, variance, skewness, kurtosis, Lorenz and Bonferroni curves, Shannon entropy are discussed. Some estimation methods are applied on Dus-Burr-XII parameters based on censored samples. A simulation study is performed to observe the behavior of estimation method under different situations. A numerical example is provided for illustration.

Keyword: Distribution theory, estimation, lifetime distribution, simulation
AMS 2010: 62N01, 62F25, 62N05

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Reliability of Systems with Two Exchangeable Components Based on Gumbel-Barnett Copula

Ismail Kinaci 1, Hatice Satilmisoglu 2 and Coşkun Kus 3

Abstract. In this study, we discuss the reliability properties of series and parallel systems consist of two exchangeable components. We assume that the lifetimes of the components have bivariate Weibull distribution constructed with Gumbel-Barnett copula. Under this setup, probability density, cumulative distribution, hazard rate and mean residual life functions are obtained.

Keyword: Gumbel-Barnett copula, reliability, series and parallel systems, Weibull distribution.

AMS 2010: 62F25, 62N01, 62N05.

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On the DUS-Kumaraswamy Distribution

Kadir Karakaya 1, İsmail Kınacı 2, Coşkun Kuş 3 and Yunus Akdoğan 4

ABSTRACT. The Kumaraswamy distribution is introduced by Kumaraswamy (1980) and it is particularly useful to many natural phenomena whose outcomes have lower and upper bounds or bounded outcomes in the biomedical and epidemiological research (Wang, 2017). In this paper, a new statistical distribution called DUS-Kumaraswamy is introduced by using DUS transformation (which is recently introduced by Kumar et al. (2015)) on Kumaraswamy distribution. The introduced distribution has same domain with Kumaraswamy and it can be used an alternative model to describe the natural phenomena mentioned above. Several distributional properties are studied such as mean, variance, skewness, kurtosis, Lorenz and Bonferroni curves, Shannon entropy and etc. The statistical inference on the parameters of Dus-Kumaraswamy is discussed by maximum likelihood and maximum LQ-likelihood methodologies. A simulation study is run to choose the best estimation method under different conditions. A numerical example is also presented.

Keyword: Distribution theory, estimation, simulation, statistical distribution.

AMS 2010: 62F25, 62N01,62N05.

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ABSTRACT. The purpose of this research is to detect an epidemic change in the mean when the data follow normal distribution. There are several parametric approaches in the literature that can be used for detecting change-points in epidemic models. Yao (1993) summarized some existing parametric approaches. In this study, we discuss these test statistics with repeated observations. A Monte-Carlo simulation study is performed to obtain critical values and power of these tests. Finally, the powers of these test statistics are compared.

Keyword: Hypothesis test, Epidemic change model, Repeated observation, Based on Likelihood ratio test, Power of test.
AMS 2010: 62F03, 62G10

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Evaluating Some Two Stage Ridge Regression Parameters: A Monte Carlo Evidence

Nimet Özbay ¹, Selma Toker ²

Abstract. Biased estimators are more resistant to multicollinearity in comparison to two stage least squares estimator in simultaneous systems. The prominent problem is the selection of the biasing parameter in this context. When this problem is revealed in a linear regression model, many authors focus on the mentioned issue. In the case that we prefer to use two stage ridge estimator, such a necessity occurs. Therefore, we examine different kinds of selection methods for the biasing parameter of the two stage ridge estimator. We reach some evidence related to the utility of the suggested estimators of the biasing parameter via a Monte Carlo experiment. The two stage ridge estimator with the proposed methods of the biasing parameter seems to be superior to the two stage least squares estimator in the sense of mean square error criterion. In addition, the best performed estimators of the biasing parameter are determined.

Keyword: Biasing parameter, multicollinearity, ridge regression, two stage least squares estimator.


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Next Day Revenue Price Forecasting in Amman Stock Exchange

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Abstract. Insurance price forecasting plays a main rule in finance and economics which has encouraged the researchers to introduce a fit models in forecasting accuracy. The autoregressive integrated moving average (ARIMA) model have developed and implemented in many applications. Therefore, in this article the researcher utilize ARIMA model in predicting the revenue dataset which have been collected from Amman Stock Exchange (ASE). As a result this article shows that the ARIMA model has significant results for short-term prediction. These results will be helpful for the investments.

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Predictions from Regression Models Using Standardized Variables

Pranesh Kumar 1

ABSTRACT. ABSTRACT: During the eighteenth century, algebraic and geometric estimation approaches were developed in fitting functions. The most celebrated method of least squares for function-fitting was due to Legendre (1806) and was discussed in determination of the orbits of comets. Legendre asserted that the sum of the squares of the errors was the simplest criterion. Gauss (1809) proposed that the sum of the fourth powers, the sum of the sixth powers or, in general, the sum of even powers as alternatives to the sum of squared errors. Standardizing data are commonly practiced in data analysis, in particular, in improvement of numerical computation and in understanding and reporting statistical models. Computations are often much simpler for standardized variables. Results obtained from standardized variables can be easily converted back to the original metric variables. In this paper, we will describe new results from the Lp-norm estimation of regression lines using standardized variables. For illustration, we will present the analysis of the experimental data on modeling the relationship between the material supplied and the percentage of material absorbed by the liquid in a chemical process. The Lp-norm regression models using standardized variables will be fitted and their performance will be studied for making tail-end predictions.

Keyword: Regression model, standardized variables, Lp-norm estimation.

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ABSTRACT. Insurance price forecasting plays a main role in finance and economics which has encouraged the researchers to introduce a fit model in forecasting accuracy. The autoregressive integrated moving average (ARIMA) model have developed and implemented in many applications. Therefore, in this article, the researcher utilizes ARIMA model in predicting the insurance price dataset which have been collected from Amman Stock Exchange (ASE). As a result, this article shows that the ARIMA model has significant results for short-term prediction. These results will be helpful for the investments.

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ABSTRACT. The empirical econometric modeling assumes that the relationship between variables is usually linear. However, in recent years, with the development of computer technology, opinions have been expressed that this relationship is irregular in econometric and financial time series. Linear time series methods are insufficient to diagnose this irregular relationship and this relationship must be accounted for in the time series analysis. Analyses of econometric time series with non-linear models mean that certain properties of time series such as mean, variance and autocorrelation vary over time [1]. Many regime switching time series models such as TAR, STAR, SETAR, LSTAR and Markov Switching model are presented in the statistical literature. These models can be divided into two basic groups according to the determination of the regime. In first group, regimes in TAR and STAR models are determined by means of a variable that can be observed. It is known exactly where the regimes determined by statistical methods coincide over time [2]. In second group, the switching between regimes in Markov switching models is controlled by an unobservable state variable contrary to TAR and STAR models [3].

The purpose of this work is to examine nonlinear time series models based on regime switching mentioned above and the application of these nonlinear time series models with a financial data set and as a result to compare the performances of these models among themselves.

Keyword: Nonlinear time series models, SETAR, information criteria.

AMS 2010: Firstly 37M10, Secondly 34A34.

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THE PREDICTION OF A SIMULTANEOUS EQUATIONS MODEL BY UTILIZING BIASED ESTIMATION TECHNIQUES

Selma Toker 1, Nimet Özbay 2

ABSTRACT. Multicollinearity induces undesirable effects on the prediction issue in a simultaneous equations model. Even though biased estimation techniques are widely used as an alternative to the two stage least squares estimation, the amount of analysis of the predictive performance of these techniques is inadequate. The primary objective of this paper is to examine the prediction performance of some estimators by utilizing the econometric model of the US economy. A numerical example incorporating this model is performed to compare the estimators by analyzing the data. Furthermore, a simulation setup is established to reach more extensive results.

Keyword: Multicollinearity, prediction, simultaneous equations model, two stage least squares estimation.


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Interval and Regional Estimation for Kumaraswamy Distribution based on Record Values

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Abstract. The Kumaraswamy distribution which has (0,1) domain has been firstly discussed by Kumaraswamy (1980). In this paper, an exact confidence interval and confidence region for the parameters of Kumaraswamy distribution are investigated based on record values. A simulation study is performed to compare the coverage probability and the mean volume of exact and asymptotic intervals and regions. A numerical example is also provided.

Keyword: Confidence interval, confidence region, Kumaraswamy distribution, simulation, record values.

AMS 2010: 62N01, 62F25, 62N05

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TOPOLOGY
NEW SORT OF GENERALIZED CLOSED SETS IN NANO TOPOLOGY

M. Davamani Christober

ABSTRACT. The notion of closed sets is the primitive in the study of topological spaces. The first step of generalizing closed sets was done by Levine when he introduced the concept of generalized closed sets in topological spaces by comparing the closure of a subset with its open supersets. Ever since, general topologists enhanced the study of generalized closed sets on the basis of generalized open sets. By considering other generalized closure operators or classes of generalized open sets, different notions analogous to Levine’s g-closed sets have been analyzed. Lellis Thivagar et al introduced a nano topological space with respect to a subset X of an universe which is defined in terms of lower and upper approximations of X. The main objective of this article is to derive and establish the concept of nano generalized closed sets by comparing the nano closure of a set with its nano open supersets. Further the characterizations of nano g-open sets are discussed like. Also we study the behaviour of nano continuous and nano closed (nano-open) functions on nano generalized closed sets.

Keyword: Nano topology, nano closed sets, nano generalized closed sets, nano continuous functions, nano closed functions.

AMS 2010: 54B05.

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Abstract. For each mathematical discipline we define at first objects and then admissible maps for describing the objects. This procedure is formalized by the concept 'category'. As well-known mathematical objects may be described by means of maps, there is an analogous description of categories via so called functors. A functor is a morphism of categories. Functors were first explicitly recognized in algebraic topology, where they arise naturally when geometric properties are described by means of algebraic invariants. Category theory and functors provide a tool by which many parallel techniques used in several branches of mathematics can be linked and treated in a unified manner. The aim of this study is to give some information about fuzzy cone normed spaces, the functions between fuzzy cone normed spaces and fuzzy cone normed spaces category.

Keyword: Category, functor, fuzzy cone normed spaces.

AMS 2010: 18Axx, 03E72.

References


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Abstract. The disoriented knot theory was first introduced in [1], which is it is based on disorientation as a generalization of the theory of the oriented knot and link. In [1], new ideas and constructions are exhibited. In this work, we will examine the complete writhe and the polynomial invariants from those new ideas and constructions. We prove that the complete writhe is a regular isotopy invariant of the disoriented diagram, and the complete writhe of all the disoriented diagrams of a non-trivial link are same. We give the bracket polynomial and the normalized bracket polynomial (the Jones polynomial) for disoriented knots and links. We show that the bracket polynomial is a regular isotopy invariant for disoriented knots and links. But, the normalized bracket polynomial is not an invariant for disoriented knots and links. We normalize the bracket polynomial with the complete writhe by considering the notion of disoriented crossing that we call the complete Jones polynomial. Thus, we see that the complete Jones polynomial is a invariant for disoriented knots and links. Also, we give a few illustrative examples.

Keyword: Disoriented knot, disoriented crossing, complete writhe, complete Jones polynomial.

AMS 2010: 57M25, 57M27.

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Some Ordered Function Space Topologies and Ordered Semi-Uniformizability

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Abstract. In this work, we define some Čech based ordered function space topologies and we introduce the notion of ordered semi-uniformizability. Then we investigate ordered semi-uniformizability of the ordered function space topologies such as compact-open (interior) and point-open (interior) ordered topologies.

Keyword: Čech closure operator, ordered topological space, preorder, semi-uniformity.

References


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ON SOFT TOPOLOGICAL PRODUCT SPACES

Kemal Tašköprü 1, İsmet Altıntaş 2

ABSTRACT. We have based our work on elementary soft topology. Firstly, we give some new properties of elementary operations and introduce a soft topological space whose topology is defined by the elementary union and intersection operations over an initial universe with a fixed set of parameters, which is different from soft topological space due to both Shabir and Naz [3] and Hazra et al [4]. We call this topology as elementary soft topology. We also define soft basis and give their basic properties in elementary soft topological spaces. Then, we describe soft function and soft continuous function. Lastly, we investigate to obtain new elementary soft topology which is elementary soft product topology by using the related existing elementary soft topologies and soft continuous functions and discuss the relative properties of elementary soft topological product space.

Keyword: Soft element, elementary soft topology, soft basis, soft product topology.
AMS 2010: 54A05, 54A10.

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Abstract. In this paper, the authors define the notion of ideal on texture spaces. The concept of di-local function is also introduced here by utilizing the families of neighborhood structure for a ditopological texture space. These concepts are discussed with a view to finding new ditopological texture spaces from the original one. Finally, we introduce and give some properties of weakly bicontinuous difunction, a subclass of bi-continuous difunction.

Keyword: Ditopology, difunction, di-ideal
AMS 2010: 54A05, 54C08.

References


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The Analytical Approach of Nano Topology on Graph Theory

M. Lellis Thivagar

ABSTRACT. The antiquity of graph theory may be traced back to the year 1735, when the Swiss mathematician Leonhard Euler solved the Konigsberg bridge problem. By assigning an appropriate direction to each edge of a graph we can produce digraph. The history of graph theory as well as topology are closely related. These two concepts share many common techniques and have common problems. Euler, in his work on the Konigsberg bridge problem referred as geometria situs the “geometry of position” whereas in the development of topological concept in the second half of the 19th century it is known as analysis situs the “analysis of position”. Basing on the topological ideas, Lellis Thivagar developed a new topology called “Nano Topology” in 2012. Nano comes from the Greek word ‘nanos’ which means ‘dwarf’, in modern scientific sense, an order of magnitude - one billionth of something. The word ‘nano’ is used simply to mean ‘very small’, for example Nano car. The word nano is prefixed to topology because of its size. Whatever may be the size of the universe it will have atmost five elements only in it. The use of nano topological ideas to explore various aspects of graph theory and viceversa, is a fruitful area of research. This paper proposes a new approach for nano topological space via closure and interior operator in simple digraphs. The basic motto of this paper is to impart the importance of Nano topology induced by graph which is taken as catalyst to find the domination number as well as all the possible dominating sets of a graph. Furthermore the computational and algorithmic aspects of graph is emphasized. To simplifying the problem I have used a Java programme code that suits even for a large graph of finite number of vertices.

Keyword: Closure, Kuratowski closure axioms, nano topology, nano $Cl_{G_{n}}$-topological space.

AMS 2010: 54C05.
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Nearness in Texture Spaces

Şenol Dost 1

Abstract. The concept of nearness space has been defined by Herrlich to characterize "nearness" between arbitrary collections of sets. Accordingly, the structure of nearness, which is defined as a covers family that provides certain conditions on a nonempty set. They provide to explain some concepts such as Cauchy filters, uniform continuity, that are not directly involved in topological spaces.

The texture space which is defined on a subset of a power set that provides certain conditions and point and complement free is a complete lattice. The ditopology structure that contains the open and closed sets defined on the texture space, is a rich structure that provides a common frame for classical topology, bitopology, and fuzzy topology. Di-functions which preserve the structure of texture spaces are the main morphisms in the theory.

In this talk, the concept of nearness will be approached within the theory of texture spaces. The conditions for obtaining a di-topology will be given by the nearness to be defined by textural covers.

Keyword: Nearness, Texture space, Ditopology.
AMS 2010: 54E17, 54A40.

References


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Abstract. In this paper, we introduce $F$-convex contraction via admissible mapping in the sense of Wardowski which extends convex contraction mapping of type-2 of Istrăţescu and establish a fixed point theorem in the setting of metric space. Our result extends and generalizes some other similar results in the literature. As an application of our main result, we establish an existence theorem for non-linear Fredholm integral equation and give a numerical example to validate the application of our obtained result. Keyword: $F$-contraction, $\alpha$-$F$-convex contraction, fixed point and non-linear Fredholm integral equation.


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POSTER
TWO DIMENSIONAL IMPROVED GENERALIZED DIFFERENTIAL TRANSFORM METHOD

Aysegul Cetinkaya¹ and I. Onur Kiymaz ²

ABSTRACT. In this study, an improvement is given for two dimensional generalized differential transform method, which gives approximate analytical solutions of initial value problems of partial differential equations with Caputo fractional derivatives. Besides, some applications of the developed method are presented.

Keyword: Generalized Taylor formula, Caputo fractional derivative, generalized differential transform method.

AMS 2010: 65L05, 26A33.

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**Abstract.** We consider two moving and one fixed elliptical planes. Thus one-parameter elliptical planar motions are defined by the help of these planes and the relation between the absolute, relative and sliding velocities is obtained. Also, canonical relative system is introduced for the one-parameter elliptical planar motion. In addition, Euler-Savary formula is given by the help of this canonical relative system. Finally, some interesting results are expressed for the Euler-Savary formula and the one-parameter elliptical planar motion.

Keyword: Kinematics, elliptical motion, Euler-Savary formula.

AMS 2010: 53A17, 53B50.

**References**


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INVESTIGATION OF THE INTERACTIONS OF $C_{24}H_{27}NiN_5O_4$ THE COMPLEX WITH DNA BASES

Bekir Batı ¹, Çiğdem Yüksektepe Ataol ² and Hümeýra Batı ³

ABSTRACT. The single crystal of $C_{24}H_{27}NiN_5O_4$ has the oxime and hydrazone groups. Oximes, aroylhydrazones, and their metal complexes have biological activities as antifungal, antibacterials, antimycobacterial, analgesic and anti-inflammatory, antiviral, antimalarial, antitubercular, antidepressant, antitumor, antioxidant, anticonvulsant, antimalarial, anti-inflammatory, anticancer agent, corrosion and enzyme inhibitors [1-4]. In this work, the single crystal structure of $C_{24}H_{27}NiN_5O_4$ has been investigated by X-ray diffraction. Single crystal X-ray diffraction results show that $C_{24}H_{27}NiN_5O_4$ crystallizes in the triclinic system, space group . The molecular structure of the title compound in both the ground state (in vacuo) and water media has been optimized by Density Functional Theory (DFT) with B3LYP/631G, B3LYP/6311G, and B3LYP/LanL2Dz basis sets. The bond parameters of the compound have been compared with the X-rays and the theoretical calculation results. The energy of the molecular structure is also calculated in gas phase by using DFT/B3LYP. The interaction of the molecule with the DNA bases such as adenine, guanine, cytosine and thymine has been investigated by using energy values in the molecular anion, cation and neutral states in water media.

Keyword: Oxime, DNA bases, DFT.

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Fibonacci Elements and Some of their Applications

Cristina Flaut

Abstract. Fibonacci elements as, for example, Fibonacci numbers, Fibonacci quaternions, Fibonacci octonions, generalized Fibonacci numbers, have many applications in Mechanics, Geometry, Coding Theory, etc. In this paper, we present, in a compact way, some of these applications.

Keyword: quaternion algebras, Fibonacci numbers, Fibonacci quaternions.

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Ruled Surface Pair Generated by a Curve and Its Natural Lift in $\mathbb{IR}^3$

Evren Ergün ¹, Mustafa Çalışkan ²

Abstract. In this study, firstly, the Frenet vector fields $\vec{T}, \vec{N}, \vec{B}$ of the natural lift $\bar{\alpha}$ of a curve $\alpha$ are calculated in terms of those of $\alpha$ in $\mathbb{IR}^3$. Secondly, we obtained striction lines and distribution parameters of ruled surface pair generated by the curve $\alpha$ and its natural lift $\bar{\alpha}$. Finally, for $\alpha$ and $\bar{\alpha}$ those notions are compared with each other.

Keyword: Natural lift, ruled surface, striction line, distribution parameter.

References


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Examination of Physicians’ Burnout and Life Satisfaction

Emrah Gurlek 1, Kamile Sanli Kula 2, Mehmet Yetis 3, and Aysu Yetis 4

Abstract. In this study, it was aimed to determine the level of burnout and life satisfaction of physicians and to determine the relationship between them. As a result of the research, it was determined that %50.6 of the physicians had a low life satisfaction and %49.4 of them had high life satisfaction. For burnout, there is no significant difference by gender, satisfaction with pay and whether or not being on call variables, according to the thought of quitting the job there is a difference in emotional exhaustion and depersonalization, no difference in competence, according to working environment satisfaction there is a difference in burnout, no difference in depersonalization and competence, and about loving of his/her work there is no difference in competence where there is a difference in burnout and depersonalization. Life satisfaction differs by gender and whether or not being on call, does not differ according to the thought of quitting the job, satisfaction of wage, satisfaction of working environment and love of work.

Keyword: Physician, burnout, life satisfaction.


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Examination of Anxiety Levels of Cerebrovascular Patients

Emrah Gurlek 1, Kamile Sanli Kula 2, and Aysu Yetis 3

Abstract. In this study, it was aimed to determine the anxiety, hospital anxiety and hospital depression of cerebrovascular patients and to examine them according to various variables. For this purpose, Trait Anxiety Scale and Hospital Anxiety and Depression Scale were applied to patients who applied for treatment to Kirsehir Ahi Evran University Education and Research Hospital for stroke.

Keyword: Cerebrovascular disease, stroke, anxiety, depression.


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INVESTIGATION OF THE MOLECULAR POTENTIAL MEP OF \( C_{24}H_{27}NiN_5O_4 \) THE COMPLEX

Hümeysra Batı 1, Çiğdem Yükseltepe Ataol 2 Bekir Batı 3 and Şeyma Karadeniz 4

ABSTRACT. The single crystal of \( C_{24}H_{27}NiN_5O_4 \) has the oxime and hydrazone groups. Acyl/aroylhydrazoneoximes are a special group of Schiff bases derived from the condensation reaction between aliphatic or aromatic acid hydrazide compounds and keto oximes. They are characterized by the presence of \( RC(=O)NHN=CR_1R_2 \) moiety, where \( R, R_1 \) can be \( H \), alkyl or aryl and \( R_2 \) is oximic groups. There is growing interest in aroylhydrazone oximes and their coordination compounds due to their wide applications in industry, medicine, synthetic, analytical bio- and coordination chemistry [1, 4]. Hydrazide-hydrazone derivatives possessing an azomethine -NHN=CH- proton constitutes an important class of compounds for new drug development [5]. In this work, the single crystal structure of \( C_{24}H_{27}NiN_5O_4 \) has been investigated by X-ray diffraction. Single crystal X-ray diffraction results show that \( C_{24}H_{27}NiN_5O_4 \) crystallizes in the triclinic system, space group . The molecular structure of the title compound in both the ground state (in vacuo) and water media has been optimized by Density Functional Theory (DFT) with B3LYP/631G, B3LYP/6311G, and B3LYP/LanL2Dz basis sets. The bond parameters of the compound have been compared with the X-rays and the theoretical calculation results. And then, molecular orbital energies of the molecular structure were calculated by using DFT. In addition to these calculations, the molecular potential mep of the complex structure has been calculated by using DFT to determine its nucleophilic and electrophilic areas.

Keyword: Oxime, hydrazone, DFT.

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One Dimensional Improved Generalized Differential Transform Method
I. Onur Kiymaz ¹ and Aysegul Cetinkaya ²

Abstract. In this study, an improvement is given for one dimensional generalized differential transform method, which gives approximate analytical solutions of initial value problems of ordinary differential equations with Caputo fractional derivatives. A general form of generalized Taylor formula is used for this improvement. With the developed method, one can get more comprehensive solutions in the sense of more integer and fractional exponents of the indeterminate.

Keyword: Generalized Taylor formula, Caputo fractional derivative, generalized differential transform method.
AMS 2010: 65L05, 26A33.

Acknowledgement: This work is supported by Kirsehir Ahi Evran University Scientific Research Projects Coordination Unit. Project Number: FEF.A4.18.017.

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MODELING OF COUPLED HEAT TRANSPORT AND WATER FLOW IN POROUS MEDIA AND FRACTURED ROCK MASSES

Lukas Krupicka

ABSTRACT. This contribution deals with modeling of coupled heat transport and water flow in unsaturated porous media accounting for conditions of freezing and thawing. The model is based on basic conservation equations, e.g. mass conservation equation and energy conservation equation. The complete model consists of two nonlinear partial differential equations with unknown total pressure head and temperature and prescribed boundary and initial conditions. Numerical procedure is based on a semi-implicit time discretization, which leads to a system of coupled nonlinear stationary equations. The next part of this contribution deals with the existence of a weak solution to the discretized problem. We also present some illustrative numerical example compared with the practical experiment. The spacial discretization is carried out by the FE-method and it is implemented in Matlab.

Keyword: transport processes, existence result, nonlinear PDE.

AMS 2010: 35A01, 35K61.

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MODELING OF CURLS OF AGNESI IN NON-EUCLIDEAN PLANES

Lyudmila N. Romakina ¹, Leonid V. Bessonov ² and Angelina A. Chernyshkova ³

Abstract. Our project is devoted to the 300th anniversary of the birth of Maria Gaetana Agnesi (16 May 1718 – 9 January 1799). We investigate curls of Agnesi [1, 2] in non-Euclidean planes. We provide here some results as examples.

Let $R_2$ be an elliptic plane [3], that is, the projective plane with fixed in it a zero curve $\gamma$. Assume that the curve $\gamma$ is set by the equation $x_1^2 + x_2^2 + x_3^2 = 0$ in the canonical frame $R = \{A_1, A_2, A_3, E\}$ of the plane $R_2$. Consider a circle $\omega$ with centre $A_3$ of radius $r$ in $R_2$. In the frame $R$ this circle has the equation $x_1^2 + x_2^2 - t^2 x_3^2 = 0$, where $t = \tan \frac{\rho}{\pi}$ and $\rho$ is the curvature radius of the plane $R_2$.

Let $a$ and $b$ be the tangents of the circle $\omega$ in its points $A(0 : -t : 1)$ and $B(0 : t : 1)$ respectively. Assume that an arbitrary beam $AX$ intersects $\omega$ at the point $C$ and the line $b$ at the point $D$. Let $c$ (or $d$) be a line which contains the point $C$ (or, respectively, $D$) and is orthogonal to the line $AB$ (or $a$). Denote the point of intersection of the lines $c$ and $d$ by $M$. When the beam $AX$ rotates around the point $A$, the point $M$ describes the curve. We call it the curl of Agnesi of the plane $R_2$ and denote by $\sigma$.

The curl Agnesi $\sigma$ is a cubic with the equation

$$4t^2(x_2 - tx_3)(tx_2 - x_3)^2 + x_1^2(x_2 + tx_3)(1 - t^2)^2 = 0, \quad t = \tan \frac{r}{\rho}. $$

If the radius of $\omega$ is equal to a quarter of an elliptic line, that is, $r = \pi \rho/4$, then the curl of Agnesi $\sigma$ degenerates to the tangent $b$ of the circle $\omega$.

If $r < \pi \rho/4$ or $r > \pi \rho/4$, then the curl of Agnesi $\sigma$ is a cubic with the acnode or node, respectively, at the point $H(0 : 1 : t)$ on the line $AB$.

We have proved that the curl of Agnesi of the pseudo-Euclidean, the co-Euclidean or the hyperbolic plane of positive curvature [4] is a cubic with a node. In the case of the pseudo-Euclidean plane the node of the curl of Agnesi lies at infinity.

Keyword: Witch of Agnesi, surfaces of Agnesi, a space with projective metrics.
AMS 2010: 14H50, 14J29.

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Abstract. In this study, job satisfaction of physicians will be examined in terms of various variables. A form of personal information and working conditions and a Minnesota Job Satisfaction Scale were applied to physicians working in the Ahi Evran University Education and Research Hospital and voluntarily agreeing to participate in the survey. As a result of the study, it was found that 79.2% of the physicians had normal job satisfaction, 20.8% had high job satisfaction. There was no difference according to gender, whether or not being on call and a meaningful difference between means according to thought of quitting the job, wage satisfaction, working area satisfaction and whether or not love his/her work.

Keyword: Physician, Job Satisfaction.
This work was supported by The Scientific Research Projects Council of Kirsehir Ahi Evran University, Kirsehir, Turkey under Grant TIP.A3.17.005.

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EXPERIMENTAL AND THEORETICAL STUDIES OF C_{13}H_{17}N_{3}O_{3} THE SINGLE CRYSTAL

Nezihe Çalışkan ¹, Çiğdem Yüksektepe Ataol ² Hümeşra Bati ³ and Pelin Kurnaz ⁴

ABSTRACT. The single crystal of C_{13}H_{17}N_{3}O_{3} has the oxime and hydrazone groups. Oximes and their metal complexes are used in many areas such as medicine, bioorganic systems, catalysis, electrochemical and electro-optical sensors [1, 2]. Hydrazones possessing an azomethine −NHN = CH− proton form an important class of compounds for new drug development. Therefore, many researchers have synthesized these compounds and their metal complexes as structures and utilized their biological activities [3]. In this work, the single crystal structure of C13H17N3O3 has been investigated by X-ray diffraction. Single crystal X-ray diffraction results show that C_{13}H_{17}N_{3}O_{3} crystallizes in the monoclinic system, space group P21/c. The molecular structure of the title compound in the ground state (in vacuo) has been optimized by Density Functional Theory (DFT) to include correlation corrections with the 6311G(d, p) and B3LYP/6-31G basis sets. The bond parameters of the compound have been compared with the X-rays and the theoretical calculation results. Molecular orbital energies of the molecular structure were calculated using TD-DFT with ultraviolet spectroscopy technique using the optimized structures with different basis sets. First, the molecular orbital energy levels in a gas phase are calculated using the B3LYP/6-31G and B3LYP/6-311G (d, p) methods, and then the energy levels of this molecular structure are calculated in different solvent environments to investigated the solvent effect on the molecular energy levels and dipole moment. In addition to these calculations, the molecular electrostatic potential map and Fukui functions of the molecular structure are investigated by DFT.

Keyword: Oxime, hydrazone, DFT.

REFERENCES


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Some New Types of Associated Curves in three Dimensional Lie Groups

O. Zeki Okuyucu ¹, O. Oğulcan Tuncer ² and İsmal Gök ³

Abstract. In this study, we introduce of D−direction curve and C−direction curve of a given curve using the alternative frame \( \{N, C, W\} \) in a three dimensional Lie group. Also, we define a \( (N, C) \) plane curve, a \( (N, W) \) plane curve and a \( (C, W) \) plane curve of a given curve and give some results related to them.

Keyword: General helix, slant helix, C−slant helix, associated curves, Lie groups.

AMS 2010: 14H50, 22E15.

References


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Examining the Strategies and Explanations that Pre-Service Teachers’ Use When Comparing Fractions

Yasemin Kiymaz and Busra KARTAL

Abstract. Fractions can be considered as one of the topics which is the most difficult to teach, the most mathematically complex, the most cognitively challenging and the most essential to be more successful in science and mathematics [1]. The foundation of fraction operations include ordering, comparing and equivalence of fractions. Teachers and students seem to have limited knowledge about fractions even though the importance of fractions is obvious [2, 3]. Pre-service teachers usually tend to find common dominators when comparing fractions [4]. This finding may be implied that pre-service teachers mostly rely on their algorithmic knowledge to compare fractions. The strategies that can be used in comparing fractions except for finding the common dominator are called as same number of pieces, same size of pieces, and comparing to a benchmark value like whole, quarter, or half etc. [5].

This study aims to investigate the strategies that pre-service teachers use and the explanations that pre-service teachers make to compare fractions. 38 pre-service mathematics teachers from a state university participated the study. Participants were asked to compare the fraction pairs given in a form, to decide which one is bigger by using more than one strategy with explaining their thinking. Any treatment about fraction comparing strategies were not given to the pre-service teachers before data collection. Content analysis will be utilized to analyze data and the findings will be discussed. The results and the implications of this study are expected to give new insights and improvements into teacher preparation programs when teaching how to teach fractions.

Keyword: Comparing fractions, strategies, mathematics education.

AMS 2010: 97F40, 97A99.

References


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AN APPLICATION OF MULTICRITERIA GROUP DECISION MAKING BY SOFT EXPERT SETS TO DIAGNOSE THE PROSTATE CANCER RISK

Zehra Guzel Ergul ¹ and Naime Tozlu ²

Abstract. Mathematics is based on exact concepts and there is not vagueness for mathematical concepts. Since in many other fields such as medicine, engineering, and economics, the notions are vague, researchers need to define some new concepts for vague- ness. To deal with these problems in real life, researchers proposed several theories such as fuzzy set [1], rough set [2], soft set [3], soft rough set [4] and soft expert set [5]. Also these theories allow researchers to solve these problems by using decision making methods. In this study, we aim to apply a different type of multicriteria decision making method to a medicine problem calculating the risk of prostate cancer and compare the obtained results with other methods [6, 7]. For this process, it is used as laboratory data, prostate specific antigen (PSA), free prostate specific antigen (fPSA), prostate volume (PV) and age of the patient.

Keyword: Soft expert set, soft set, rough set, multicriteria decision making methods.
AMS 2010: 03E72, 90B50.

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References


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