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PREFACE

Dear Conference Participants,

Welcome to the Ninth International Conference on IFS and Contemporary Mathematics and Engineering (**IFSCOM-E 2023**). The aim of our conference is to bring together important engineers and mathematician researchers from all over the world with different engineering and mathematical interests. This conference is one of the leading international conferences to present new and fundamental advances in different fields of Engineering and Mathematics and to highlight interdisciplinary studies. We want to provide a suitable environment where researchers can exchange ideas, discuss the latest research findings and collaborate to generate new different ideas. We are happy to have outstanding researchers in different fields such as Mathematics and other fields related to Engineering sciences.

It is also the aim of the conference that young researchers and graduate students engage in such exceptional event. Their inputs and participation in such event should encourage them to do more research activities in the future.

We would like to thank all participating scientists who made the most important contribution to this conference. Their contributions are the key ingredient to the success of the conference.

We are sincerely grateful to all participants who really value our work and efforts that we develop every year to improve this conference. We are so proud to reach this respected level of success. Indeed, this was not possible without the outstanding work, efforts and supports from the members of the conference team: Scientific Committee Members, Referee Committee Members and Local Organizing Committee Members.

We are very pleased to present the abstracts of the Ninth International Conference on IFS and Contemporary Mathematics and Engineering (**IFSCOM-E 2023**). The conference was completed with **167** participants and **174** papers. The distribution of research papers delivered by the participants are classified by the following fields: Applied Mathematics, Algebra, Geometry, Topology, Analysis, Statistics and other fields such as Financial Mathematics, Fuzzy Sets, Game Theory, Geometric Computer Aided Design, Graph Theory, Intuitionistic Fuzzy, Machine Learning and Mathematical Modeling, Mechanical Engineering, Food Engineering, Information Visualization, Visualization Literacy, Environmental Engineering, Measurement of Fluid Properties, Civil Engineering, Natural Disaster, Industrial Engineering.

Two keynote speakers and four invited speakers attended the conference to share information about current studies in different fields with our participants. We have 167 participants participated from 21 countries: Canada, Mexico, India, Morocco, Poland, Russia, Turkey, etc..

This abstract booklet contains the titles and abstracts of all presented talks during the conference. Many submitted articles to this conference are considered in the following listed journals and books:

Journals:

- Journal of Universal Mathematics (JUM)
- Kahramanmaraş Sutcu Imam University Journal of Engineering Sciences
- Karamanoğlu Mehmetbey University Journal of Engineering and Natural Sciences
- Notes on Intuitionistic Fuzzy Sets (Notes on IFS)

Books:

- IFSCOM-E 2023 Abstract Book with an ISBN number
- IFSCOM-E 2023 Proceeding Book with an ISBN number
- SPRINGER Book

We wish that all participants participate in all sessions, ask questions and be active in the conference. We also wish that this conference is a great place where you meet new friends, gain some knowledge, and get yourself involved in some research collaborations.

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**INVESTIGATING THE TIME-DOMAIN SENSITIVITIES TO
NONLINEAR HYDRODYNAMIC INTERACTIONS OF A
RESONANT MICRO-CANTILEVER WITH GLYCEROL-WATER
SOLUTIONS IN MULTI-FREQUENCY OPERATIONS**

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ABSTRACT

In this work, a forced Van der Pol oscillator based dynamic model is introduced to demonstrate the time-domain sensitivities of the micro-cantilever to the micro-rheological properties of the surrounding fluids. Effects of diverse multi-frequency excitations on hydrodynamically forced displacements are investigated for the glycerol-water solutions with different concentrations. It is demonstrated that the frequencies of the displacements under hydrodynamic loads decrease with increasing dynamic viscosity and density of the fluid (among 55% and 85% Glycerol-water solutions) in bimodal- and trimodal-frequency excitations. In addition, steady-state observables are achieved at only particular eigenmodes in single- and multi-frequency operations depending on the nonlinearity level of the dynamic systems. It is highlighted that hydrodynamically forced periodic oscillations are obtained for the first and second eigenmodes by utilizing a nonlinear oscillator with the highest selected value of forced Van der Pol parameter ($\mu = 10^{30}$) for all excitation schemes. Under tetramodal-frequency excitation, the vibration frequency of around 7.33 MHz and amplitude of around 0.03 pm are achieved at the first eigenmode for 75% Glycerol-water solution. Therefore, the micro-cantilever nonlinear sensitivity to micro-rheological properties at the fundamental and higher eigenmodes could be improved by utilizing multi-frequency excitation schemes.

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GENERATORS OF F/R' LEIBNIZ ALGEBRAS

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ABSTRACT

Let F be a free Leibniz algebra generated by the set $X = \{x_1, \dots, x_n\}$ over the field K of characteristic 0 and let R be an ideal of F . In this study, a necessary and sufficient condition for n elements of the Leibniz algebra F/R' to be a generating set is given.

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THE NECESSITY OF USING RECYCLED WASTE AGGREGATE IN TURKIYE

EREN YAĞMUR

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ABSTRACT

Concrete is the most commonly used construction material in the world. According to the amount of concrete production announced every year, Türkiye ranks first among all European countries in ready-mixed concrete production. It is a major concern for sustainability as we use large amounts of natural resources to produce materials such as concrete. Approximately 75% aggregate can be used in the production of normal-strength concrete. On the other hand, Türkiye is located on the Alpine-Himalayan seismic belt, and high-intensity earthquakes are expected to occur frequently. As a result of the destructive effects of these earthquakes, a significant amount of demolition waste is generated. 11 provinces were affected by the last Kahramanmaraş earthquakes in our country, and the number of heavily damaged or destroyed buildings is given as 61222, according to the records. Using these wastes as effectively as possible will ensure both savings in raw material usage and the beneficial elimination of these high-rate wastes, which have many negative effects. In this study, the effect of the recycled aggregate added to the concrete mix in different proportions on the mechanical properties of the concrete and its usability was investigated.

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THE GRADIENT AND PARTIAL DERIVATIVES OF BICOMPLEX NUMBERS: A COMMUTATIVE-QUATERNION APPROACH

ALI ATASOY

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ABSTRACT

The study of bicomplex numbers, specifically commutative-quaternions, offers a fascinating exploration into the properties of complexified quaternions with commutative multiplication. Understanding the gradient and partial derivatives within this mathematical framework is crucial for analyzing the behavior of bicomplex functions. Real quaternions are not commutative but bicomplex numbers are commutative by multiplication. Bicomplex numbers are the special case of real quaternions. In this study, gradient and partial derivatives are obtained for bicomplex number valued functions.

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A FUZZY SOFT SET-BASED APPROACH TO IDENTIFY ACADEMIC DISHONESTY AND MISCONDUCT

ESRA KORKMAZ

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ABSTRACT

Academic dishonesty and misconduct are significant challenges in educational settings, posing serious threats to academic integrity and students' well-being. Addressing this problem requires an effective decision-making to determine appropriate interventions and sanctions. In this study, we present a novel approach that utilizes fuzzy soft sets, resulting in robust and flexible decision-making processes.

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SECOND ORDER MODEL REDUCTION OF HIGHER ORDER SYSTEMS AND PID CONTROLLER DESIGN

ALİ YÜCE

ABSTRACT

Reduced order systems are used to avoid computational complexity in higher order plant models. Low-order or standardized transfer functions are more suitable for controller design. In addition, Salem presented a non-overshoot and analytical PID controller design technique for standard quadratic systems. In this study, efficient PID controller design for high-order systems is carried out with the help of a second-order reduced model. The curve fitting technique is used to reduce the model to the second-order structure. The open loop unit step response of the higher order system is fitted with the parametric unit step response of the standard quadratic system. Particle Swarm Optimization (PSO) algorithm is used to detect unknown ζ and ω_n parameters. The analytical method proposed by Salem has been applied for the PID controller design of second-order model. Thus, PID controller design for any higher order system is performed in two stages using model reduction and model based PID controller design techniques. It has been seen that the efficient PID controller designed for the second order equivalent models is a suitable design for the higher order system.

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ON THE EXPONENTIAL STABILITY OF STATIONARY AND PERTURBED IMPLICIT SYSTEMS

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ABSTRACT

In the present work, we study the exponential stability of the stationary differential systems of the form: $Ax'(t) - Bx(t) = 0$ for all $t \geq t_0$, where A and B are linear bounded operators in Hilbert spaces. The obtained results on the one hand are the generalization of the Liapounov theorem for the spectrum of the operator pencil $\lambda A - B$. On the other hand, the establishment of the exponential stability conditions for the stationary and perturbed systems described by as: $Ax'(t) - (B + B(t))x(t) = 0$.

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LOCALLY RECOVERABLE CODES BASED ON THE MATRICES DERIVED FROM THE MAGIC SQUARES

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ABSTRACT

An (n, k, r) locally recoverable code (for shortly LRC) is a code of length n and dimension k over a finite field such that a symbol in any coordinate of a codeword can be recovered by accessing the symbols in at most r other coordinates. These codes are used in distributed storage systems by Microsoft Azure and Hadoop since they can recover a failed node by accessing the minimum number of the surviving nodes. A matrix is called as an (r, t) -regular matrix if its each row has uniform weight r and each column has uniform weight t . In this study, new (r, t) -regular matrices are obtained by using the magic squares and the parametrization of an LRC code is given by using these (r, t) -regular matrices.

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NEW NUMBER SEQUENCES BUILT ON HYBRID NUMBERS

M. UYSAL AND E. ÖZKAN

ABSTRACT

In this study, we define new number sequences with the help of hybrid numbers. We give the basic definitions and properties of these number sequences. We examine some properties associated with these numbers. We obtain Binet's Formulas and generating functions and calculate some important identities such as Cassini's identity of these hybrid number sequences.

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MODELING AND ANALYSIS OF CAPACITATED NONLINEAR NETWORK TRAFFIC ASSIGNMENT PROBLEM

HASAN DALMAN

ABSTRACT

This paper is devoted to the study of Traffic Assignment Problems with Capacities [3]. The traffic network is represented as a directed graph consisting of nodes and connections ([1]-[4]). The problem aims to determine the user flow pattern in a transportation network while considering capacity limitations on the links. As it is well known, when the capacity of a link reaches its saturation point, the traffic volume starts to increase, leading to congestion and queues. In such networks, the focus is on each user selecting their optimal path. In this study, the static network is transformed into a dynamic one to find the user equilibrium. The neural dynamic network approach, employing Euler and Runge-Kutta methods, is utilized to analyze congestion and flow dynamics in the network.

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CYCLIC DNA CODES OVER MIXED ALPHABETS

TULAY YILDIRIM

ABSTRACT

In this paper we purpose to construct cyclic DNA codes over the mixed alphabets. We discuss their generator polynomials as well as the structure of seperable codes. Using the structure of these codes, we study cyclic DNA codes. By using Gray map, we define correspondence between DNA codons of alphabets and the elements of the ring. Also, we discuss some conditions of cyclic codes over the given ring to be reversible and reversible-complement. As applications, we provide examples of new cyclic DNA codes.

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SOLVABILITY AND GUH STABILITY RESULTS OF FUZZY NONLINEAR ABC -FRACTIONAL COUPLED SYSTEM

AZIZ EL GHAZOUANI, M'HAMED ELOMARI, AND SAID MELLIANI

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ABSTRACT

In this paper, we mainly take into account a fuzz nonlinear Atangana Baleau Caputo fractional coupled equations. After discussing several key ideas on fuzzy ABC operator, some new and easily verifiable sufficient criteria of solvability are obtained. We further prove that this system is generalized Ulam Hyers (GUH) stable. Finally, an example is applied to explain the availability of our major results.

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CLIQUE MATCHING NEIGHBORHOOD POLYNOMIAL OF GRAPHS

ALDISON M. ASDAIN AND ROSALIO G. ARTES JR.

ABSTRACT

A *clique* in a graph G is a subset of $V(G)$ which induces a complete subgraph of G . If $v \in V(G)$, the *neighborhood* of v in G is the set $N_G(v) = \{u \in V(G) : uv \in E(G)\}$. For a subset S of $V(G)$, the *neighborhood system* of S in G is the set $N_G(S) = \bigcup_{s \in S} N_G(s) \setminus S$. Two edges in a graph G are said to be *incident* if they

share a common vertex. A subset T of $E(G)$ is said to be an *independent edge set* if T is mutually non-incident. An independent edge subset T of $E(G)$ is called a *matching*. The *matching neighborhood* of a subset S of $V(G)$ is a subset of the edge neighborhood system of S in G which is independent. The *clique matching neighborhood polynomial* of a graph G is given by $\Psi_{cmn}(G; x, y) = \sum_{j=0}^{n-i} \sum_{i=1}^{m(G)} m_{ij}(G) x^i y^j$,

where $m_{ij}(G)$ is the number of i -matching subsets of $E(G)$ with a matching neighborhood system of maximum cardinality equal to j and $m(G)$ is the cardinality of a maximum matching subset of $E(G)$, called the *matching number* of G . In this paper, we established the clique matching neighborhood polynomials of some special graphs and graphs resulting from some binary graph operations.

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ROLE OF THE WEAK ALLEE PHENOMENA ON A PREDATOR-PREY MODEL

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ABSTRACT

The Allee effect is known as a reduction of the per capita growth rate of a population of biological species at densities smaller than a critical value. An individual of a species that is subject to an Allee effect will suffer a decrease in some aspect of its fitness when conspecific density is low. The Allee effect which can have considerable effects on predator-prey dynamics has been classified into two categories: strong Allee effect and weak Allee effect. It is called a strong Allee effect if the per capita growth rate in the limit of low density is negative. It means that when the population density falls below a certain threshold, the population may struggle to grow or even face extinction. A weak Allee effect means that the per capita growth rate is positive at zero density. A predator-prey system with a strong Allee effect on the prey population can result in prey extinction or reduced predation dynamics. On the other hand, populations with weak Allee dynamics exhibit slower growth rates when their densities are low, but they never reach negative per-capita growth rates, meaning there is no specific threshold they need to surpass.

This study deals with a discrete-time predator-prey model which describes the interaction of prey and predator. The considered model is formed by adding the Allee effect on prey. The stability of the fixed point of the model and the existence conditions of the period-doubling bifurcation are investigated. In addition, the direction of the examined bifurcation is given. Moreover, several simulations to support our analysis results are given.

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ON A GENERAL INCLUSION THEOREM

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ABSTRACT

In the present study, a theorem which gives necessary and sufficient conditions for the inclusion relation between $|A, p_n, \beta; \delta|_k$ (see [1]) and $|B, p_n, \beta; \delta|_k$ summability methods is introduced. Also, some known results are deduced from this theorem.

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ON INFRA FUZZY-SOFT TOPOLOGICAL SPACES

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ABSTRACT

It is always interesting to obtain structures that retain some topological properties but have a weaker condition. In this study, we will introduce a topological structure that is not closed under arbitrary combination and is a subfamily of the family of fuzzy soft sets. Firstly we will give definitions of this subfamily. The basic properties of this space, which we will call infra-fuzzy soft topological spaces, will be investigated. We will show that the union of infra fuzzy-soft topological spaces is not a infra fuzzy-soft topological space. In the upcoming work we will examine the equivalents of some topological concepts in infra-fuzzy-soft topological spaces.

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ON DERIVATIONS OF FREE BICOMMUTATIVE ALGEBRAS

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ABSTRACT

Objects

* Identities defined as $(x_1x_2)x_3 = (x_1x_3)x_2$ and $x_1(x_2x_3) = x_2(x_1x_3)$ are called right symmetry and left symmetry, respectively.

* An algebra satisfying both right and left symmetries is called bicommutative.

* A nilpotent linear derivation δ of a bicommutative algebra F is called a Weitzenböck derivation. The set $F^\delta = \{u \in F : \delta(u) = 0\}$ is a subalgebra of F called the algebra of constants of the derivation δ .

* We assume that $F_{2n} = \langle x_1, y_1, \dots, x_n, y_n \rangle$ is the free bicommutative algebra of rank $2n$ over a field of characteristic zero, and δ_{2n} is its Weitzenböck derivation such that $\delta_{2n}(y_i) = x_i$, $\delta_{2n}(x_i) = 0$, for each $i \in \{1, \dots, n\}$.

Objectives

* We study the algebra $F_{2n}^{\delta_{2n}}$ of constants of δ_{2n} , and provide a generating set of this algebra.

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GENERALIZATION OF ALMOST PRIMARY AND NILARY IDEALS IN NONCOMMUTATIVE RINGS

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ABSTRACT

In this paper we review works done on [4]. We extend the concept of almost primary ideals from commutative rings to noncommutative rings by introducing the notion of almost right primary ideals. We generalize the notion of nilary ideals in [7], and investigate various characteristics and properties that are specific to these ideals. Furthermore, we analyze rings in which every ideal can be classified as an almost right primary ideal (or an almost nilary ideal). Specifically, we identify the key properties of decomposable rings in which every ideal can be categorized as an almost right primary ideal (or an almost nilary ideal).

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LOCAL LOWER SEPARATION AXIOMS IN Q -REFLEXIVE SPACES

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ABSTRACT

Several authors have extended the classical separation axioms of topology to topological categories. In 1991, these axioms were extended to an arbitrary set-based topological category by Baran [5] in terms of initial, final structures and discreteness. He defined the separation axioms first locally and then point free.

The development of lattice theory has led to the study of various mathematical frameworks using lattice structures, including lattice-valued topology [4], quantale-valued approach space [2, 7], quantale-valued metric space [3], lattice-valued preordered space [4]. This encourages us to research local separation axioms in quantale-valued reflexive spaces, a generalization of quantale-valued preordered spaces [9].

In this paper, we first introduce the category **Q-RRel** consisting of quantale-valued reflexive spaces and Q -monotone mappings, which is a normalized topological category over **Set**, the category of sets and functions. Additionally, we characterize each of the local T_i , $i = 0, 1, 2$, and $PreT_2$ Q -reflexive spaces and investigate the relationships among them.

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INVARIANT ALGEBRAS IN POLYNOMIAL RINGS

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ABSTRACT

It is well known that the algebra of invariants of a finite group in the polynomial algebra of finite rank has a finite generating set. In this talk, we handle some concrete subgroups of the symmetric group, and investigate generating sets for their invariant algebras in polynomial rings of low rank.

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AN ACTION OF DIHEDRAL GROUP

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ABSTRACT

Classical invariant theoretical studies were started by the fourteenth problem of Hilbert asking the number of minimal generators of the algebra induced by the action of subgroups of the general linear group on the commutative associative unital algebra of finite rank. In the current work, we discuss the dihedral group action and provide an explicit generating set.

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AN ALMOST UNBIASED RIDGE ESTIMATOR IN BETA REGRESSION

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ABSTRACT

In this paper we introduced an almost unbiased beta ridge estimator to overcome the problem of multicollinearity in the beta regression model. The proposed estimator is based on the well-known ridge estimator and its extension to the beta regression model. Although, the beta ridge estimator is useful in the presence of ill-conditioned data matrices, it has large bias. Thus, it is reasonable to propose an almost unbiased ridge type estimator in beta regression. An extensive Monte Carlo simulation study is performed to compare the performance of the proposed almost unbiased beta ridge estimator to beta ridge estimator and the maximum likelihood estimator. According to the results of the simulation study, almost unbiased beta ridge estimator has lower mean squared error and squared bias values for certain scenarios.

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Key words and phrases. Beta regression, Ridge estimator, Almost unbiased, Maximum likelihood method, Multicollinearity.

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REVOLUTIONIZING MATRIX COMPUTATIONS: A PRACTICAL APPROACH FOR EFFICIENT CALCULATION OF MATRIX SIGN FUNCTION

GUL KARADUMAN

ABSTRACT

Matrix computations are fundamental operations in numerous scientific and engineering fields, such as machine learning, quantum mechanics, and numerical analysis. Calculating the matrix sign function, which determines the sign of each entry in a matrix, is of great significance in these applications. However, efficiently computing the matrix sign function remains challenging, especially for large matrices. This study introduces a way to approximate the matrix sign function using the Taylor expansion and Generalized Minimal Residual (GMRES) algorithm. The proposed approach reduces the computational complexity and enhances the numerical stability, making it highly practical for a wide range of applications.

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MULTIPLICATION RULES FOR POINTWISE INNER AUTOMORPHISMS IN LIE ALGEBRAS

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ABSTRACT

Let K be a field of characteristic zero, and $N_{m,c}$ be the free metabelian nilpotent of class c Lie algebra of rank m over K . In this talk, we consider the group of pointwise inner automorphisms of $N_{m,c}$, and establish multiplication rules in this group for low nilpotency classes c and ranks m .

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EXACT SOLUTION OF THE SCHRÖDINGER EQUATION IN TOPOLOGICALLY MASSIVE SPACETIME

ALI TARSUSLU AND KENAN SOGUT

ABSTRACT. We study exact solutions of the Schrödinger equation in a topologically massive space-time. Exact solutions are obtained in terms of the hypergeometric functions. We also obtained the momentum quantization with the help of the condition of the wave function to be bounded. The investigation is performed in the framework of rainbow formalism of the General Relativity Theory (RGT). The quantized momentum is evaluated for different choices of the rainbow functions.

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AN APPLICATION OF CONTROLLED SETS IN MEDICAL DIAGNOSIS

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ABSTRACT

Fuzzy set introduced by Zadeh as an extension of crisp sets in 1965[11]. Several generalization of fuzzy sets The intuitionistic fuzzy set concept was defined by Atanassov in 1983 [1] as an extension of fuzzy sets by enlarging the truth value set to the lattice $[0, 1] \times [0, 1]$. Intuitionistic fuzzy sets have different application areas such as logical programming, machine learning, decision making problems. Medical diagnostic applications have studied in intuitionistic fuzzy sets with different approaches, as distance measure, similarity measure etc [7, 8, 9, 10]. In this study, controlled sets were applied to medical diagnosis. The results obtained with using the smallest distance were compared with the results of previous studies.

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ON TRANSLATION SURFACES

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ABSTRACT

In this article, generating curves of translation surfaces are paired with some special curve pairs. With the results obtained from these pairings, the developable and minimal translation surfaces are characterized. In addition, the surface curvatures of the translation surface are obtained. For a better understanding of the results, examples are given and their drawings are made with the help of Mathematica.

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COMPLEX MATRIX VERSION OF HYBRID NUMBERS

Ç. RAMİS AND Y. YAZLIK

ABSTRACT

Dual, complex, and hyperbolic number systems are combined to generate the hybrid number system in four dimensional space \mathbb{E}_2^4 [3]. In this study, we transform hybrid numbers into a new form and define a linear transformation over complex matrices. The characteristics of complex matrix representation are examined and their algebraic properties are derived.

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APPROXIMATE SOLUTIONS OF THE MODIFIED KRATZER POTENTIAL PLUS SCREENED COULOMB POTENTIAL IN N-DIMENSIONS

A. ÖZFİDAN

ABSTRACT

We investigate the bound state solutions of the N-dimensional Klein-Gordon equation with the modified Kratzer potential plus screened Coulomb potential via the asymptotic iteration approach. By the use of Greene-Aldrich approximation, we construct the N-dimensional energy spectrum and the N-dimensional radial wavefunction in relativistic theory. To test the accuracy of our analytical approach, we compare the present results with other reported works.

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ON LEAP ZAGREB INDICES OF A SPECIAL GRAPH OBTAINED BY SEMIGROUPS

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ABSTRACT

In 2013, Das et al. defined the monogenic semi-group graphs [1]. And, various topological indices of the monogenic semi-group graphs have been calculated so far [2, 3]. The aim of this study is to continue to create formulas for the topological indices of these special graphs. In this study, we give exact formulae for various the leap Zagreb indices of this special algebraic graph obtained from monogenic semi-groups.

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APPROACH TO INTUITIONISTIC FUZZY SETS WITH COMPARATIVE EXAMPLES OF DECISION MAKING METHODS IN DIFFERENT FIELDS

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ABSTRACT

Intuitionistic fuzzy sets are of interest to many researchers both in theory and in practice. Moreover, applications of decision making methods on intuitionistic fuzzy sets are popular research areas today and yield effective results. Recently, with the help of intuitionistic fuzzy sets, decision making applications are made in many areas such as education, engineering, medicine, personnel selection, etc. In this study has been investigated how intuitionistic fuzzy sets are used and benefitted from these sets in different application areas.

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APPROXIMATION OF MAX-PRODUCT TRUNCATED BASKAKOV OPERATORS BY FUZZY NUMBERS

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ABSTRACT

The main purpose of this paper is to use called Truncated Baskakov operator of max-product kind for approximating fuzzy numbers with continuous membership functions. We will show that these operators additionally maintain the quasi-concavity in a manner analogous to the specific case of the unit interval. These results turn out to be particularly useful in the approximation of fuzzy numbers since they will enable us to construct fuzzy numbers with the same support in a straightforward manner. Additionally, these operators provide a good order of approximation for the (non-degenerate) segment core.

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A METHOD FOR DECIDING APPLICABILITY OF BLOCKCHAIN IN AVIONICS SYSTEMS

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ABSTRACT

New threats are emerging every day for existing avionic systems that utilize centralized architectural structures. A security vulnerability in any avionic system poses a threat to data security, flight safety, crew safety, and privacy [1]. The centralized architecture of current systems used for air traffic control leaves aircraft vulnerable to various attacks. These attacks can result in aircraft hijacking, data manipulation, data deletion, and disruption of synchronized communication. Similarly, systems employing this centralized architecture struggle to effectively control the entire airspace when planning routes for swarm aerial vehicles [2]. Blockchain technology possesses the potential to offer solutions to these challenges with its decentralized structure. Blockchain technology can enhance avionic systems in terms of core services, promote information sharing, and provide a comprehensive data view to improve security and aircraft operability [3]. However, the use of blockchain is not necessary for every encountered problem, nor can the same type of blockchain resolve every problem. It is crucial to evaluate different types of blockchains, considering their pros, cons, and limitations, in order to select the most suitable type. At this point, understanding the specific needs that blockchain excels in meeting becomes imperative. This study proposes a method to comprehend the applicability of blockchain as a viable solution method. The ability to consider blockchain as an option while fulfilling the functions of the designed avionic system constitutes a fundamental component in determining whether blockchain usage is necessary for the problem. The initial steps of the proposed method involve a comprehensive understanding of the problem within the avionic system, conducting a thorough analysis of its structure, and clearly defining the system's functions. With this method, after establishing that blockchain can be considered as an option, different types of blockchains can be compared based on their advantages, disadvantages, and limitations to select the most suitable one.

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ON ISOLATED SUBSEMIGROUPS OF ORDER-DECREASING TRANSFORMATION SEMIGROUPS

M.YAĞCI

ABSTRACT

For an arbitrary set X , the set \mathcal{T}_X of all transformations of X is a semigroup under composition, and called the full transformation semigroup on X . If $X = X_n = \{1, \dots, n\}$ with its natural order, then \mathcal{T}_X is denoted by \mathcal{T}_n . A transformation $\alpha \in \mathcal{T}_n$ is called order-decreasing if $x\alpha \leq x$ for each $x \in X_n$. The semigroup of all order-decreasing transformations in \mathcal{T}_n is denoted by \mathcal{D}_n . Let $E(\mathcal{D}_n)$ be the set of all idempotents in \mathcal{D}_n and for any $\xi \in E(\mathcal{D}_n)$, let

$$\mathcal{D}_n(\xi) = \{ \alpha \in \mathcal{D}_n : \alpha^m = \xi \text{ for some } m \in \mathbb{Z}^+ \}.$$

A subsemigroup T of a semigroup S is called isolated provided that for all $x \in S$, the condition $x^n \in T$ for some $n \in \mathbb{N}$ implies $x \in T$. In this talk we show that $\mathcal{D}_n(\xi)$ is the unique isolated nilpotent subsemigroup of \mathcal{D}_n .

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A NOVEL METHODOLOGICAL FRAMEWORK TO IDENTIFY THE CRITERIA FOR DECISION-MAKING PROBLEMS IN NEUTROSOPHIC FUZZY ENVIRONMENT

Ö.F.GÖRÇÜN AND H. KÜÇÜKÖNDER

ABSTRACT

Identification of the pertinent evaluation criteria plays a key role to construct the structural form of a decision problem and well-managing the decision-making process. In that regard, considering the previous works carried out by the researchers and identifying the criteria set influencing the decision-making problem solutions is a commonly followed way in the literature. Another approach is to apply the experts' opinions also. the main emphasis of both approaches is similar, and both attempt to address decision-making problems properly by considering the right and suitable criteria. However, both approaches suffer from some limitations and structural problems. For instance, identifying the criteria by considering the previous studies in the literature only may lead to including some criteria which are not updated and have no influence adequately in the scope of the appraisal process. Also, neglecting the opinions of experts having experience and knowledge may lead to overlook some significant details in practice. Also, it may cause to encounter many difficulties to adapt the real-world conditions for the practitioners. Similarly, identifying the criteria by considering only experts' views may lead to neglecting of some focal factors and criteria existing in the literature. Also, subjective appraisals may dominate the evaluation process more. This paper proposes a methodological framework involving two stages to merge both approaches from the mathematical perspective. The first stage allows the experts to assess the criteria existing in the literature. Besides, they can add or eliminate criteria based on the advantages of the proposed procedure. The second stage presents the extended form of the Delphi approach based on the Type-2 neutrosophic fuzzy numbers (T2NF-numbers) to handle highly intricate uncertainties in the group decision-making process concerning the criteria' evaluation and identification. The suggested methodological framework is applied to solve a real decision-making problem, and it introduces to the members of the research society by discussing the obtained outcomes.

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SOLVING NONLINEAR SHE EQUATIONS USING HHO ALGORITHM

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ABSTRACT

Selective Harmonic Elimination-Pulse Width Modulation (SHE-PWM) is a widely used modulation technique in power electronics. However, solving SHE equations requires complex and computationally intensive calculations. To tackle this complexity, algorithms inspired by nature have been developed. This study focuses on solving 11-level nonlinear SHE equations using the Harris Hawks Optimization (HHO) algorithm. The results demonstrate the effectiveness of the HHO algorithm in solving nonlinear SHE equations for 11-level modulation schemes within the modulation index range of 0.1 to 1.0.

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DNA CODES FROM REVERSIBLE GROUP CODES BY A VIRUS OPTIMISATION ALGORITHM

ADRIAN KORBAN, SERAP ŞAHINKAYA, AND DENİZ USTUN

ABSTRACT. In this paper, we employ group rings and some known results on group codes to study reversible group DNA codes. We define and study reversible cyclic DNA codes from a group ring point of view and we also introduce the notion for self-reciprocal group ring elements. Moreover, we search for reversible group DNA codes with the use of a virus optimisation algorithm. We obtain many good DNA codes that satisfy the Hamming distance, the reverse, the reverse-complement and the fixed GC-content constraints.

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GEODETIC INDEX OF GRAPHS

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ABSTRACT

Let G be a connected graph. For two vertices u and v in a graph G , the geodetic closure of $\{u, v\}$ is the set $I_G[u, v] = \{u, v\} \cup \{y : y \text{ lies in a } u\text{-}v \text{ path in } G\}$. We introduced a new graph topological index called the geodetic index of G which is given by $g_i(G) = \sum_{u,v \in V(G)} |I_G[u, v]|$. In this paper, established relationships between the graph theoretic properties of G and its corresponding geodetic index. Moreover, we have generated results on the geodetic index of some special graphs and graphs resulting from the join and the corona of two connected graphs.

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INDUCED PATH POLYNOMIALS OF THE JOIN AND CORONA OF GRAPHS

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ABSTRACT

Let G be a connected graph. An induced path in G is a path in G induced by a subset of $V(G)$. The induced path polynomial of G , denoted by $P(G; x)$, is the generating function of the sequence $\langle p_i(G) \rangle_{i=0}^{\infty}$, where $p_i(G)$ is the number of induced paths in G of order i . In this paper, we characterized the induced paths in graphs resulting from the join and corona of two connected graphs. Finally, we established the induced path polynomials of graphs resulting from these two binary graphs operations in terms of the induced path polynomials of the graphs being considered.

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CONVEX INDEPENDENT COMMON NEIGHBORHOOD POLYNOMIAL OF GRAPHS

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ABSTRACT

For two vertices u and v in a graph G , the geodetic closure of $\{u, v\}$ is the set $I_G[u, v] = \{u, v\} \cup \{y : y \text{ lies in a } u\text{-}v \text{ path in } G\}$. The geodetic closure of a subset S of $V(G)$ is the set $I_G[S] = \bigcup_{u, v \in S} I_G[u, v]$. A subset S of $V(G)$ is said to be convex

if for every pair of vertices $\{u, v\} \subseteq S$, the geodetic closure of $\{u, v\}$ is contained entirely in S . A convex subset of cardinality i is called an i -convex set. The convexity number of a graph G is the cardinality of a maximum proper convex subset of $V(G)$ and is denoted by $con(G)$. A convex subgraph as defined by Artes and Laja [2] in 2014, is a subgraph of G induced by a convex subset of $V(G)$.

We introduce a new graph polynomial as follows: The convex independent common neighborhood polynomial of a graph G of order n in the indeterminates x and y is given by $\Gamma_{cicn}(G; x, y) = \sum_{j=0}^{n-i} \sum_{i=1}^n c_{ij}(G) x^i y^j$, where $c_{ij}(G)$ is the number of i -convex subsets in G with a corresponding maximum independent subset of the common neighborhood system has cardinality equal to j .

In this paper, we established the convex independent common neighborhood polynomial of graphs resulting from the join and the corona of two connected graphs.

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MASKED AND UNMASKED FACE RECOGNITION ON UNCONSTRAINED FACIAL IMAGES USING HAND-CRAFTED METHODS

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ABSTRACT

In this study we tried to apply the face recognition task on masked faces using hand-crafted methods. Due to COVID-19 and masks, facial identification from unconstrained images became a hot topic. To avoid COVID-19, most people use masks outside. In many cases, typical facial recognition technology is useless. The majority of contemporary advanced face recognition methods are based on deep learning, which primarily relies on a huge number of training examples, however, masked face recognition may be investigated using hand-crafted approaches at a lower computing cost than using deep learning systems. We intend to construct a low-cost system for recognizing masked faces and compare its performance to that of face recognition systems that do not use masks. The proposed method fuses handcrafted methods using feature-level fusion strategy. This study compares the performance of masked and unmasked face recognition systems. Experiments are undertaken on two publicly accessible datasets for masked face recognition: Masked Labeled Faces in the Wild (MLFW) and Cross-Age Labeled Faces in the Wild (CALFW). The results are encouraging compared to the state-of-the-art models.

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A NOTE ON HIGHER ORDER PELL 2^s -IONS

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ABSTRACT

In this study, we describe higher order Pell numbers. We establish higher order Pell 2^s -ions whose components are these numbers. We obtain recurrence relation, Binet's formula, generating function, exponential generating function, Vajda's identity, Catalan's identity, Cassini's identity and d'Ocagne's identity of higher order Pell 2^s -ions. In addition, we generate a matrix whose entries are higher order Pell 2^s -ions and use these matrices to obtain Cassini's identity as a novel type.

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SOME PROPERTIES OF LEONARDO SEDENIONS

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ABSTRACT

In this study, we investigate Leonardo sedenions. We provide some relationships among Fibonacci, Lucas and Leonardo sedenions. Furthermore, we derive recurrence relations, generating function, Binet's formula, exponential generating function, Catalan's identity, Cassini's identity and d'Ocagne's identity of Leonardo sedenions.

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ON MODELING ON MULTIPLICATIVE CALCULUS FOR POPULATION GROWTH

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ABSTRACT

Grossman and Katz developed a comprehensive framework of calculus that extended beyond classical calculus, encompassing various branches of non-Newtonian calculus [6]. Non-Newtonian calculus, with its infinite sub-branches, such as geometric, anageometric, biogeometric, quadratic, and harmonic calculus, offers diverse perspectives. Among these sub-branches, geometric calculus, also known as multiplicative calculus [1, 7], introduces a distinct approach. Multiplicative calculus proves particularly valuable in scenarios where products and ratios naturally facilitate the combination and comparison of magnitudes. Numerous authors [1, 3–5] have extensively explored the principles of multiplicative calculus in various studies. In this study, population growth models, which are based on classical differential equations and whose solutions are determined by an exponential function, will be reconstructed on multiplicative calculus and solutions of equations containing multiplicative derivatives will be found in the established models.

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THE EVALUATION OF THE CRITERIA TO BE TAKEN INTO ACCOUNT WHEN SELECTING ONLINE SHOPPING SITES BASED ON INDUSTRY 4.0 WITH USING DEMATEL METHOD

ZEYNEP DURMAZ AND ERDEM AKSAKAL

ABSTRACT

In recent years, with the rapid development of technology and the increasing use of the Internet, interest in online shopping sites has increased even more. Given this growing consumer interest, the competition among online shopping sites is increasing daily. In this competitive environment, it is of great importance to be a preferred platform that attracts consumers' attention. This study discusses the evaluation process of the criteria believed to be effective in the preference of online shopping sites based on Industry 4.0. The criteria to be considered in the study are: product information and variety, timely and accurate delivery, website design and performance, reliability/confidentiality, and customer satisfaction. The DEMATEL method will be used to determine the relationships and importance of these criteria. In this way, the process of determining the criteria to be considered in the environment of online competition will be shown and the criteria that are assumed to contribute to it will be evaluated.

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CONNECTED, COMPACT, AND SOBER OBJECTS IN *CONLIM*

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ABSTRACT

In this paper, we characterize (strongly) closed subsets of a constant limit space and show that they induce a notion of closure. Furthermore, we introduce the notions of c -connected, compact, quasi-sober, sober, irreducible objects in **ConLim** (the category of constant limit spaces and continuous maps.), where c is a closure operator of **ConLim**. Finally, we examine the relationship as well as interrelationships between them.

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FINITE ELEMENT METHOD FOR THE NONLOCAL ELLIPTIC PROBLEM WITH A p -KIRCHHOFF-TYPE OPERATOR

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ABSTRACT

This work is devoted to the study of the finite element method for a class of non-local elliptic problems associated with p -Kirchhoff-type operator. There has been active ongoing research on the study of problems associated with the p -Laplace operator, which appears in a variety of physical fields [2, 3, 4]. In particular, a lot of attention has been devoted to nonlocal problems. One of the justifications of such models lies in the fact that in reality the measurements are not made pointwise but through some local average. This work is devoted to the study of the finite element method for a class of nonlocal elliptic problems associated with p -Kirchhoff-type operator. The convergence and *a priori* error estimates for the discrete formulation are established. Moreover, the finite element formulation is nonlinear, it can then be solved by Newton-Raphson's iterative but the main issue is that the Jacobian matrix of the Newton-Raphson method is full due to the presence of the nonlocal term thereby making computation expensive. The scheme presented here takes into account such issues. The predictions observed theoretically are validated by means of numerical experiments.

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STATISTICAL CAUCHYNESS WITH DEFERRED CESÀRO MEAN IN ASYMMETRIC CONTEXT

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ABSTRACT

In this study, deferred Cesàro mean statistical Cauchy sequences were defined in asymmetric metric spaces. Since the lackness of symmetry causes failures several classic statements in the asymmetric context, the conditions required for a deferred statistically convergent sequence to be a deferred statistically Cauchy have been investigated in such spaces.

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COMPARISON OF PREDICTORS/ESTIMATORS IN GENERAL LINEAR MODELS WITH STOCHASTIC RESTRICTIONS

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ABSTRACT

In this study, we have given some results regarding the comparison of predictors/estimators under general linear models with stochastic restrictions. By choosing the best linear unbiased predictors/estimators (BLUPs/BLUEs), which is one of the predictors/estimators, we have obtained comparisons according to the mean square error matrix criterion (MSEM). We have used rank and inertia formulas in matrix algebra. For topics related to the results obtained in this paper, please refer to the following references [1]-[3].

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APPROXIMATE SOLUTIONS OF THE INTEGRO-PARTIAL FRACTIONAL EQUATION INVOLVING TEMPERED ψ -CAPUTO FRACTIONAL DERIVATIVE

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ABSTRACT

This manuscript proposes an approximate solution for weakly singular kernel partial integrodifferential equations with tempered ψ -Caputo fractional derivative of order $\alpha \in (0, 1)$. Our method employs a second order time difference approximation and uses the tempered fractional integral operator together with piecewise linear interpolation to compute the singularity of the kernel arising during the discretisation process. In addition, the stability of the method is evaluated by using Von Neumann analysis. To show the reliability and applicability of the proposed approach, numerical examples have been solved.

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SOLVABILITY OF A SYSTEM OF THIRD-ORDER DIFFERENCE EQUATIONS

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ABSTRACT

In this study, we investigate the following four-dimensional system of difference equations

$$\begin{cases} u_n = \frac{\alpha u_{n-3} t_{n-2} + \beta}{\gamma v_{n-1} t_{n-2} u_{n-3}}, \\ v_n = \frac{\alpha v_{n-3} u_{n-2} + \beta}{\gamma w_{n-1} u_{n-2} v_{n-3}}, \\ w_n = \frac{\alpha w_{n-3} v_{n-2} + \beta}{\gamma t_{n-1} v_{n-2} w_{n-3}}, \\ t_n = \frac{\alpha t_{n-3} w_{n-2} + \beta}{\gamma u_{n-1} w_{n-2} t_{n-3}}, \end{cases} \quad n \in \mathbb{N}_0,$$

where the initial values u_{-k} , v_{-k} , w_{-k} , t_{-k} , $k \in \{1, 2, 3\}$, and the parameters α , β , and γ are real numbers. The solutions of aforementioned system are obtained in explicit form. In addition, we examine the solutions according to some special cases of the parameters. Finally, numerical examples are given to demonstrate the theoretical results.

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PROPERTIES OF GENERALIZED SEMI CLOSED SETS IN THE TOPOLOGY

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ABSTRACT

Levine [3, 4] introduced semi-closed sets in 1963 and generalized closed sets in topology in 1970. There are many studies in the literature about generalized open sets, generalized closed sets, and their properties [2, 5]. After, Bhattacharyya et al. [1] were introduced the concepts of generalized semi closed sets using semi closure to characterize the s -normality axiom in 1990. If (X, τ) is a topological space and $A \subset X$, then A is called generalized closed if $\bar{A} \subset U$ whenever $A \subset U$ and $U \in \tau$, where \bar{A} is semi closure of A . If semi closed is taken instead of usual closed and semi closure is taken instead of usual closure in this definition, we obtained the generalized semi closed (in brief, gs - closed) set concept.

In this paper, we found the various papers in the field of gs - closed sets. We used these sets to study the notions like gs - closure operators, gs -closed mappings, gs - regular, and gs - normal spaces.

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EXISTENCE THEOREMS FOR SET-VALUED OPERATORS IN WC-BANACH ALGEBRAS

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ABSTRACT

In this work, we aim to establish suitable conditions that will ensure the existence of the solution for set-valued operator equations in WC-Banach algebras. We present some new set-valued existence theorems under these conditions. Finally, to prove these results, we used the measure of weak non-compactness technique and generalized D-Lipschitzian.

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NOVEL INEQUALITIES FOR GENERALIZED FRACTIONAL INTEGRALS APPLIED TO SYNCHRONIZED CONVEX FUNCTIONS

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ABSTRACT

In this article, we demonstrated that the product of two synchronized convex functions is also synchronized convex. Subsequently, utilizing this convexity property, we derived new fractional integral inequalities. These inequalities were extended using the generalized Riemann-Liouville fractional integral. In our study, we discovered and proved these inequalities, which support the existing results in the literature.

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TOTALLY UMBILICAL SEMI-INVARIANT SUBMANIFOLDS OF POLY-NORDEN MANIFOLDS

ŞERİFE NUR BOZDAĞ

ABSTRACT

In this study, semi-invariant submanifolds of poly-Norden manifolds are introduced. Particularly in totally umbilical semi-invariant submanifolds, distributions that are orthogonal complement to each other in the tangent bundle are discussed. The integrability and total geodesic foliation conditions of these distributions were obtained.

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ON k -CONFORMABLE FRACTIONAL OPERATORS

SÜMEYYE ERMEYDAN ÇİRİŞ AND HÜSEYİN YILDIRIM

ABSTRACT. In this study, we define the left and right fractional k -conformable integrals and derivatives. Furthermore, we obtained the fractional k -conformable derivatives of functions associated with some spaces and express their properties.

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SIGN LANGUAGE RECOGNITION MOBILE APPLICATION FOR TURKISH LANGUAGE

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ABSTRACT

Sign language is a common and reliable way of communicating with deaf and dumb people. This language can be done anywhere around the world however most people do not know and understand sign language. When people do not understand that special group of people, they either try to isolate themselves from the community or they get angry. In order to overcome that type of problem, sign language applications have been developed which help deaf and dumb people to convey their ideas to others. Sign language tools simply convert sign language into text in real-time. This research aims to develop a mobile application that converts sign language into text for the Turkish Language. This research focuses on the accuracy of the recognition. Our Application resulted in 96,3% accuracy for three words.

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QUALITY CLASSIFICATION OF CERAMIC SANITARYWARE PRODUCTS WITH MACHINE LEARNING TECHNIQUES

SEDANUR ŞİMŞEK AND ERDENER ÖZÇETİN

ABSTRACT

Ceramic products have a wide range of applications in industry due to their properties such as high temperature resistance, high hardness and corrosion resistance. On the other hand, many factors can influence the production process of ceramic products and managing the quality control process can be challenging. Machine learning methods are widely used in classification and prediction problems, in the ceramic industry. In this study, we focus on the quality classification of products using data from a large-scale ceramic sanitary ware manufacturing plant. For this real-life problem, there are two classes in terms of quality depending on the data used. For the two-class problem, several machine learning methods were used to build models and discussions were made on the results obtained.

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BEST APPROXIMATION OF FIXED POINT RESULTS IN GENERALIZED METRIC SPACES

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ABSTRACT

In 1970[26], Takahashi provided examples of convex structures in metric spaces that were not embedded in a Banach space, prompting further exploration in this area. Then, in 2012[14], the authors introduced subcompatibility and subsequential continuity concepts to prove common fixed point theorems in metric and convex metric spaces, along with related theorems on best approximation. Finally, in 2021, the authors presented a modified version of their theorem, building upon their earlier work[25]. We hereby present an introduction to a congruous concept, albeit within diverse types of metric spaces.

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SOME FIXED POINT APPLICATIONS OF F-MODULAR METRIC

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ABSTRACT

In this paper, we provide several demonstrations of fixed point theorems within the framework of F-metric modular spaces, which were previously introduced and defined as a means of conceptualizing modular metrics[3]. Additionally, we propose a novel approach to the Banach contraction principle specifically tailored for F-metric spaces[1]. Our research focuses on establishing various coincidence and common fixed point theorems within the realm of F-metric spaces[2].

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OPEN-LOOP CONTROL VS CLOSED-LOOP CONTROL IN SMART IRRIGATION: A GAME THEORETICAL PERSPECTIVE

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ABSTRACT

This paper examines a decision-making problem involving the selection of open-loop versus closed-loop control for smart irrigation in agriculture by using game theory. In this regard, the use of open-loop control in addition to closed-loop control will be evaluated by a number of parameters in terms of their economic framework. For this reason, a game theoretical platform will be established for two farmers in the field, one of whom uses open-loop control and the other uses closed-loop control for agricultural irrigation. The goal of the study is to determine which type of control results in greater economic and sustainable gains in agriculture. Using the grey wolf optimizer, numerical experiments are conducted based on a sample table of parameter values for each control structure, from which decision-making processes are derived.

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FRACTIONAL ECFGM(1,1) MODEL WITH AN APPLICATION

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ABSTRACT

The grey forecasting models are one of the tools used in the forecasting of time series. It has been one of the popular research areas in recent years due to its low estimation error and practicality in terms of applicability. In addition, fractional grey models have become more desirable than other models, despite the difficulty in calculations, since they give more accurate results than integer order models. The complexities and difficulties in fractional calculations have begun to be overcome owing to new definitions and theorems made in recent years. The new trend in grey modelling is to compose models that are more useful than the previous ones and give results with less error. In this work, a novel fractional grey model derived by using the conformable fractional derivative theory. This new model abbreviated as ECFGM (1,1). The verification of the method is shown with real data set and it has been shown that the proposed conformable fractional grey model is more effective than the existing models.

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FRACTIONAL APPROACH TO SOME FUNDAMENTAL CONCEPTS OF SURFACE

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ABSTRACT

In this study, some basic concepts of surfaces are redefined with the help of conformable analysis. Obtained results are compared with classical results. It is stated that which concepts change or do not change with the effect of the conformable derivative. In addition, it is mentioned why the conformable derivative is used and what its advantages are. In order to better understand the results obtained, examples are given and drawings are made with the help of Mathematica.

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FEKETE-SZEGÖ PROBLEM FOR TWO NEW SUBCLASSES OF BI-UNIVALENT FUNCTIONS DEFINED BY BERNOULLI POLYNOMIAL

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ABSTRACT

This investigation deals with two new subclasses of analytic and bi-univalent functions defined by Bernoulli polynomial. In this paper, coefficient estimation and Fekete-Szegő problems are solved for these newly defined function subclasses. In addition, certain remarks are indicated for the subclasses of bi-starlike and bi-convex functions.

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GENERALIZED KANTOROVICH-SCHURER-TYPE OPERATORS

NURSEL ÇETİN

ABSTRACT

In this paper, we consider Kantorovich extension of generalized Bernstein-Schurer operators depending on a non-negative integer parameter. We prove approximation theorems in the space of continuous functions and L_p -space. Moreover, we obtain some estimates for the rate of convergence by using modulus of continuity and L_p modulus of smoothness of the first order.

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OPTIMIZATION OF GURNEY FLAP OVER NACA 0018 BY USING SURROGATE MODELING

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ABSTRACT

This research investigates the impact of the Gurney flap on the aerodynamic performance of the NACA 0018 airfoil at a Reynolds number of $Re = 1 \times 10^5$. A total of forty data sets are generated using the Halton sampling method, and computational fluid dynamics (CFD) simulations are performed on each set. The CFD outputs are then utilized to train a surrogate model based on the Kriging method. The optimization process employs the differential evolution algorithm to determine the optimal Gurney flap height, width and angle of attack values. The findings demonstrate that the optimized Gurney flap configuration leads to a significant enhancement in the lift coefficient, with an average increase of approximately 26.9%. These results underscore the effectiveness of the Gurney flap as a means to improve the aerodynamic performance of the NACA 0018 airfoil at the specified Reynolds number. Further investigations and experimental validations are recommended to validate the obtained results and explore potential applications in practical aerodynamic designs.

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APPROXIMATION BY BIVARIATE COMPLEX SCHURER-STANCU POLYNOMIALS IN COMPACT DISKS

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ABSTRACT

This study focuses on investigating the ability of the tensor product type bivariate complex Schurer-Stancu operators to approximate analytic functions on compact polydisks. The study derives the simultaneous approximation order and Voronovskaja-type outcomes for these polynomials using a qualitative estimate. The results provide insights into the accuracy of these polynomials in approximating analytic functions and their associated compact polydisks.

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Key words and phrases. Schurer-Stancu operators, Bivariate complex operators, Rate of convergence, Exact order.

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APPROXIMATION BY GENERALIZATION OF BERNSTEIN-SCHURER OPERATORS

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ABSTRACT

In this study, we investigate some approximation properties of a new generalization of Bernstein-Schurer operators. Firstly, we give a uniform approximation result and the rate of convergence by means of modulus of continuity. Then, we obtain Voronovskaja and Grüss-Voronovskaja results. Finally, we demonstrate some numerical examples relevant to our results.

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PRECONDITIONING LINEAR SYSTEMS USING KRONECKER SUM DECOMPOSITION

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ABSTRACT

In this study, we proposed a new matrix decomposition (Kronnecker sum decomposition KSD) and applied it to create a new technique to preconditioning linear systems based on Incomplete Cholesky decomposition and we found an improvement in convergence acceleration of iterative methods.

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SOME NUMERICAL APPROACHES FOR COMPUTING THE HANKEL TRANSFORM

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ABSTRACT

In this study some approaches have been investigated for the numerical computation of the Hankel transform and Bessel functions. The Hankel transform [1] of a function $f(r)$, $0 < r < \infty$, is defined as

$$H_v\{f(r); s\} = \int_0^\infty f(r)rJ_v(rs)dr$$

where J_v is the Bessel's function of the first kind of order v [2] and $rJ_v(rs)$ is the kernel of the Hankel transform. The Hankel transform arises in solving numerous boundary-value problems in a relatively straightforward way, using various properties of Bessel functions. The aim in these applications is to transfer the problem to a solvable space, solve the problem in that space, and then return to the original space using the inverse transform. As applications, we presented approximate solutions of two boundary value problems [3].

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FROM SIMPLICIAL HOMOTOPY TO CROSSED MODULE HOMOTOPY

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ABSTRACT

Simplicial commutative algebras are involved in homological algebra, homotopy theory, algebraic K-theory and algebraic geometry. Arvasi and Porter have recently worked on the n -types of simplicial algebras in [8, 9]. Also Akça and Z.Arvasi [2], examined higher order Peiffer elements in simplicial Lie algebras.

Group crossed modules were firstly introduced by Whitehead in [3, 4]. The homotopy relation between crossed module maps $: G \rightarrow G'$ was introduced by Whitehead in [4], in the context of “homotopy systems”, now called free crossed complexes. In [6] (see also [7]), homotopy was investigated in terms of a monoidal closed structure on crossed complexes, and an interval object. Homotopy for crossed complexes was also developed in [5].

In [1], we show clearly that, the homotopy relation for free simplicial algebras morphisms $\mathbf{X} \rightarrow \mathbf{X}'$ is an equivalence relation. And than, we prove that this notion of homotopy yields a groupoid with objects being the simplicial algebra morphisms between two fixed 1-truncated simplicial algebras (with free domain), and the morphisms being the homotopies between 1-truncated simplicial algebra morphisms.

In this work, we obtain a homotopy of crossed module maps from homotopy of simplicial maps and we obtain a homotopy of simplicial maps from homotopy of crossed module maps.

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A GENERALIZATION OF THE LINEAR POSITIVE OPERATORS BY USING THE SPECIAL POLYNOMIALS

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ABSTRACT

In this talk, we introduce a new generalization of Szász operators with the help of special polynomials. Firstly, we examine the convergence rate of our new operator and then we find some approximation results. We also investigate new relationships using Gould-Hopper and Hermite polynomials respectively, which are more specific examples. Finally, a Voronovskaya-type theorem is given.

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COMPUTATIONAL AEROACOUSTIC MODELING OF SUPERSONIC CAVITY FLOWS USING OPEN-SOURCE FLOW SOLVERS

R.KABA, M. NİKBAY, AND B. ZAFER

ABSTRACT

Cavity flow is a fluid mechanics problem that engineers from many different disciplines may encounter. Today, many problems such as aircraft landing gear, weapon and store bays, windshield gaps and sunroofs of vehicles can be defined with this flow.

Although a cavity has a simple geometry, it has very complex flow physics. This complexity creates high-order drag resistance, energy loss, acoustic vibration and noise for the system or component in which it is located. In addition, it negatively affects the radar visibility, which has been intensively studied in the military industries in recent years. Reducing the radar cross section is often given great importance in the design of modern fighter aircraft. On the other hand transonic and supersonic flight continuity have become essential in new generation military aircrafts. A particular consequence of such requirements is the embedded weapon bay in the aircraft configuration.

In this study, computational aeroacoustic modeling of supersonic cavity flows is investigated by using open source solvers and validated with the main test studies in the literature. Referenced test problem M219 cavity is examined in detail and with many inputs, assumptions and methods will be determined for the numerical analysis to be made. OpenFOAM with HISA was used for simulations.

With this study, the high-accuracy simulations required for the optimization study were performed by using IDDES (Improved Delayed DES) coupling k- ω SST. Simulations were compared with reference studies (test and numerical [1]) in terms of SPL and OASPL values. Extensive knowledge has been acquired about the FFT transformation method, which allows switching from the time domain to the frequency domain for pressure data. The analysis were run until the flow time of 0.17 seconds.

This case is a challenge for CFD due to its unsteady nature and high frequency content. The acoustic character of the cavity is analyzed in detail. Rossiter modes

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Key words and phrases. Cavity flow, Aeroacoustic modeling.

trends all succeeded within an agreeable range. It has been observed that the mesh model captures acoustic noise generation better and the aft wall of the cavity plays the most important role in terms of acoustics, as given in the wind tunnel test study.

Future work will focus on the implementation of the developed aeroacoustic modeling strategies into a multidisciplinary design optimization framework efficiently to improve the aeroacoustic performance of cavity flows.

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ON A ONE TYPE FRACTIONAL STURM-LIOUVILLE PROBLEM

P.TÜRKMEN

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ABSTRACT

The concept of fractional order derivatives has been studied for a long time. The reason for this is that integer order derivatives are thought to be insufficient to explain physical events, will be better expressed with a fractional order derivative, and will give better results. The most commonly used fractional calculus types are Riemann-Liouville's and Caputo's fractional derivatives and integrals. In this study, first the approaches and solution proposals in these fields are emphasized, and then a one type Sturm-Liouville boundary value problem is studied. Especially, some important theorems in classical Sturm-Liouville theory are examined for the fractional case.

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ALMOST SUPRA B-CONTINUOUS FUNCTIONS

FATMA TALAS AND AYNUR KESKIN KAYMAKCI

ABSTRACT

In this paper we investigate the notion of λ strong β -I-open sets which are complement of λ strong β -I-closed sets. Then, defining types of contra continuity for λ strong β -I-closed sets we will give properties and characterizations of them. Finally, two low separation axioms, namely strong β -I-TTThe important properties of it that is stronger than both almost supra pre-continuity and almost supra semi-continuity and weaker than almost supra β -continuity.

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USING FUZZY-LOGIC IN MARKET CONDITIONS FOR EFFICIENT PORTFOLIO SELECTION IN THE CASABLANCA STOCK EXCHANGE

A. HAMIDI ALAOUI

ABSTRACT

Does history repeat itself? Yes it does; but not the exact same way. Market conditions dictate on investors and traders how they invest their money. But since humans learn and adapt, they may not repeat the same decisions they have taken in previously observed market conditions. Consider a market composed of N stocks, S_1, \dots, S_N , with market capitalizations C_1, \dots, C_N . Let Ω be a set of uniquely designed texts, Σ a set of market conditions, Ψ_1 a mapping from \mathbb{R} to Σ , Ψ_2 a mapping from Σ to Ω , $\Psi = \Psi_2 \circ \Psi_1$, and Φ is a fuzzy-matching algorithm from Ω to Ω^d . At time t_0 , let τ_0 be the mapping of all market capitalizations using Ψ , $\tau_{-1}, \tau_{-2}, \tau_{-3}, \dots$ be the mappings of all markets capitalizations that occurred before t_0 , and $\Phi_0 = [\Phi(\tau_0)]_i$ be the best match using an extra one-day lag match. Φ_0 occurred at time t_{-k} . We look for the efficient portfolio at time t_{-k+1} and build a similar portfolio at time t_0 . This method shows that, almost 73% of the time, the portfolio we obtain is among the 1000 most efficient portfolios in the 20000 simulated portfolios for daily data between January 01, 2009 and December 31, 2019. Computationally, we can conclude that matching overall market conditions, not necessarily individual stock conditions, can give better investment decisions in the Casablanca Stock Exchange.

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USING FUZZY-LOGIC IN MARKET CONDITIONS FOR EFFICIENT PORTFOLIO SELECTION **21**

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THE SELFADJOINT SCHRÖDINGER OPERATOR ON THE HALF LINE WITH A REAL-VALUED COMPACTLY SUPPORTED POTENTIAL

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ABSTRACT

For the selfadjoint Schrödinger operator on the half line with a real-valued compactly supported potential, it is shown that the boundary condition at the origin and the potential are uniquely determined by the continuous part of the Gel'fand-Levitan spectral data alone. It is also shown that the boundary condition and the potential are uniquely determined by the continuous part of the Marchenko scattering data alone.

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ON AN EIGENPROBLEM OF THE FRACTIONAL STURM-LIOUVILLE BOUNDARY VALUE PROBLEMS

Z.GEÇİT

0009-0003-0337-5916

ABSTRACT

In this presentation, we consider fractional Sturm-Liouville problems. We calculated the eigenvalues and eigenfunctions by means of decomposition method. Firstly, we refer to some definitions and theorems of the fractional Sturm-Liouville problems. Finally, we explained our approach with an example.

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COMPOSITIONS OF PERMUTING N-DERIVATIONS WITH COMMUTATIVITY FOR ASSOCIATIVE RINGS

MEHSIN JABEL ATTEYA

ABSTRACT

The main purpose of this paper is to introduce the compositions of the permuting n -derivations \triangle of R . This formula represents the keystone of investigating results concerning commutativity and centralizer permuting n -derivations for prime and semiprime rings. We establish theorems for centralizer mappings (resp. commuting mappings) and weakly semiprime ideal of a semiprime ring R .

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Key words and phrases. n -derivation, Semiprime ring, Permuting mapping, Centralizer mapping.

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POSITIVE TOEPLITZ OPERATORS BETWEEN HARMONIC BLOCH SPACES ON THE BALL

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ABSTRACT

The theory of Toeplitz operators on harmonic or holomorphic Bergman spaces on the unit ball is a well established subject. In this study, we define generalized Toeplitz operators between weighted harmonic Bloch spaces b_α^∞ on the unit ball of \mathbb{R}^n ($n \geq 2$) for the full range of parameter $\alpha \in \mathbb{R}$. We give characterizations of bounded and compact Toeplitz operators taking one weighted harmonic Bloch space into another in terms of certain Carleson and vanishing Carleson measures. Our results extend those known for standart harmonic Bloch spaces.

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ON SOME NATURAL GEOMETRIC DIFFERENTIAL OPERATORS

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ABSTRACT

The aim of this talk is to present a method to extend to manifolds endowed with a general geometric structure, the classical gradient and Laplace operators, and also to analyze some of their natural properties.

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Key words and phrases. Geometric structures, Gradient-like vector fields, Invariant functions, Laplace-like operators.

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GENERALIZED SYMMETRIC BI-DERIVATIONS OF UP(BCC)-ALGEBRAS

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ABSTRACT

In this paper, we define the notions of generalized (l, r) -symmetric bi-derivations and generalized (r, l) -symmetric bi-derivations on UP-algebras. We also explore some of the properties these derivations.

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Key words and phrases. UP-algebras, Generalized symmetric bi-derivations, Trace, BCC-algebras.

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A NOTE ON FUZZY PRODUCT RULE

TAHIR CEYLAN

ABSTRACT

In this study, the author considers a different method to product rule of fuzzy numbers. The basic properties and inclusions about this method are given. Finally, the author presents some examples to compare the properties.

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VISLIT-TEST: DESIGNING EFFECTIVE VISUALIZATION LITERACY ASSESSMENT TEST

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ABSTRACT

Data volume and complexity continue to increase, and the ability to comprehend and interpret visual representations becomes crucial for making informed decisions and identifying meaningful insights. Understanding the ability of users to analyze and extract relevant insights from visuals requires evaluating their visualization literacy skills. However, creating an efficient visualization literacy assessment test is a non-trivial task. This paper recommends key practices for creating assessment tests to gauge users' visualization literacy skills. These practices are presented based on designing an effective visualization literacy assessment and the structure of the literacy test.

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A GUIDELINE TO DESIGNING CROWDSOURCED ONLINE EXPERIMENTS FOR EVALUATING VISUALIZATION LITERACY

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ABSTRACT

As data becomes increasingly complex, comprehending and interpreting visual representations becomes essential for informed decision-making and valuable insights. With visualizations gaining significance across various domains, it is vital to effectively assess users' visualization literacy skills and provide opportunities to enhance them. This paper offers a comprehensive guide on organizing online experiments for evaluating visualization literacy, leveraging advantages such as scalability and accessibility, and reaching a diverse participant pool. However, successfully organising these experiments requires planning and considering various factors. The paper outlines practices and considerations for online experiments to evaluate visualization literacy.

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MIXED INTEGER LINEAR PROGRAMMING MODEL FOR OPTIMIZING UNIVERSITY EXAM SCHEDULES

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ABSTRACT

Examinations are a critical aspect of education as they provide a systematic and measurable method of evaluating a student's knowledge, understanding, and skills. Consequently, the exam timetable is a vital tool that determines the dates, times, and venues for each exam. However, developing an exam timetable is a complex process that involves considering several factors to ensure a hassle-free and comfortable exam period. This study aims to design a multiobjective optimization model that takes into account various considerations, such as the maximum possible interval between exams for students at the same level, no overlapping exams for the same faculty, teacher availability, sufficient room capacity for each exam, an appropriate schedule for online exams, and manually set exam dates. The developed model has two main objectives: a) maximum duration between exams, b) lowest number of occupied venues and staff at the same time. To evaluate the effectiveness of the generated timetable, the model was used to schedule the final exams for the fall semester 2022-2023 at the main campus of Uskudar University. The findings indicated that there was no overlap between exams for students at the same level, and the time gaps between exams were extended as much as possible, while taking into account specific constraints like teacher availability and venue capacity. A survey was also conducted among the students to gauge their satisfaction level. Despite being selective about exams, 53% of the regular students found the timetable to be more convenient and less stressful than the previous year, with none reporting it to be more stressful, while the remaining students did not notice any discernible difference.

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Key words and phrases. Mixed Integer Linear Programming, Multi Objective Optimization, Exam timetable, Scheduling, Optimization.

We would like to dedicate this work to the Faculty of Engineering and Natural Sciences at Uskudar University for the endless support.

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DECOMPOSITIONS AND INVERSES OF SOME LOWER TRIANGULAR MATRICES

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ABSTRACT

Matrix decompositions have been a trending study topic that has attracted attention by many researchers in order to facilitate the solutions of engineering and mathematical problems in recent years. In this paper, by using some analytical techniques, we obtain the inverse of some lower triangular matrices. We give decompositions of these type matrices via generalized Fibonomial type matrices of the first and of the second kind. We derive several newly identities and provide more generalized results by virtue of these type matrices. Finally, we compare the performance of our results with the results obtained with MATHEMATICA's Inverse method.

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ON A NEW CLASS OF HYPERBOLIC FIBONACCI FUNCTIONS VIA SOME SPECIAL POLYNOMIALS

SURE KÖME AND YASİN YAZLIK

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ABSTRACT

In recent years, many researchers have studied hyperbolic Fibonacci functions and some special polynomials, which are important areas of mathematics. In this study, we give an extension of the Euler polynomials in order to obtain the correlation between the hyperbolic Fibonacci functions and Euler polynomials. We define symmetrical Fibonacci sine and symmetrical Fibonacci cosine functions for some special Euler polynomials. Moreover, we derive new identities for these types of symmetrical Fibonacci functions by using analytical techniques.

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ON INTUITIONISTIC FUZZY PRIMARY DECOMPOSITION OF INTUITIONISTIC FUZZY IDEALS

P.K. SHARMA

This paper is dedicated to Prof. K.T. Atanassov.

ABSTRACT

In this presentation, we shall discuss the intuitionistic fuzzy version of the Lasker-Noether Decomposition Theorem, which states that every proper ideal in a Noetherian ring can be expressed as an irredundant intersection of finitely many primary ideals and that any two of such decompositions yield the same set of radical ideals. To establish the above result, we first introduce the notion of intuitionistic fuzzy primary ideals of a ring and obtained many results about it. We also give an example of an intuitionistic fuzzy ideal in a ring that cannot be written as an intersection of a finite number of intuitionistic fuzzy primary ideals.

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APPLICATIONS OF SELECTION, DETERMINATION AND DECISION MAKING IN EDUCATION WITH THE HELP OF FUZZY LOGIC

ALI SINAR, ERHAN ÇETINKAYA, AND AHU MERYEM CUVALCIOĞLU

ABSTRACT

After the fuzzy sets were defined by Zadeh, they attracted the attention of many researchers both in theory and in practice. In recent years, the expression of decision-making methods with fuzzy sets has created a brand new perspective in application areas. In this study, fuzzy decision making methods in the field of education were examined and decision making application was made with the help of fuzzy logic. Student achievement, selection, determination and placement stages in the field of education were researched with fuzzy decision making methods.

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A MAXIMAL TYPE OF ZAGREB INDEX

B. AYDIN AND N. AKGÜNEŞ

ABSTRACT

In this paper we introduced a new type of Zagreb index. Results over special graphs have been obtained. Also some graph transformations have been defined then extremal maximal Zagreb indices have been found.

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EXAMPLES AND APPLICATIONS OF DECISION MAKING IN THE FIELD OF EDUCATION USING INTUITIONISTIC FUZZY SETS

ERHAN ÇETINKAYA, ALI SINAR, AND AHU MERYEM CUVALCIOĞLU

ABSTRACT

Since intuitionistic fuzzy sets contain membership, non-membership and hesitation degrees together, they give very effective results in the decision-making part of many application areas, such as education, medicine, engineering. In this study, decision making applications made with the help of intuitionistic fuzzy sets in the field of education were examined. In this study, decision making methods were researched, a decision-making practice in which students and teachers were evaluated in education was made by using intuitionistic fuzzy sets in the field of education.

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BRIEF QUALITATIVE PROPERTIES OF THE REGULARIZED PRABHAKAR FRACTIONAL SYSTEM

MUSTAFA AYDIN

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ABSTRACT

In time, developing and changing real-world problems force to improve or generalize the available concepts and produce new notions. The concept of the fractional derivative is a production of this reality, that is, a fractional derivative means that the derivative has a fractional order, which is a generalization of an integer-order derivative. Until the last two decades, contributions of the integer calculus (traditional calculus) whose keystone is the integer-order derivative to the scientific world are undeniable. But, in the last two decades, fractional calculus whose keystone is the fractional derivative apparently has become more apparent in the scientific world. Of course, everyone can put forward lots of reasons for that. It is surely beyond doubt that one of these reasons is that almost all of the obtained findings for fractional calculus are also in effect for traditional calculus. Another important one may be the fact that most of the problems of today can be formulated more suitably by virtue of fractional calculus according to traditional calculus. Nowadays, fractional calculus has been applied so many sorts of areas such as control theory, biophysics, engineering, signal, electrochemistry, mathematical physics, etc; see[1]-[7]. The Prabhakar fractional derivative which is the keystone of Prabhakar fractional calculus[8]-[13] is a quite new and comprehensive definition containing many of the available fractional derivatives such as the Lorenzo-Hartly, Gorenflo-Minerdi, the Miller-Ros, Riemann-Liouville, Caputo fractional operators, etc. The following Prabhakar system in the reference [14]

$$\begin{cases} {}^{PC}_{0+}\mathcal{D}_{\alpha,\beta}^{A,\delta}v(t) = Bv(t) + f(t, v(t)), & t \in (0, T], \\ v(0) = v_0 \end{cases}$$

where ${}^C_{0+}\mathcal{D}_{\alpha,\beta}^{A,\delta}$ stands for the regularized Prabhakar Caputo-type derivative of fractional order $0 < \beta < 1$, $A, B \in \mathbb{R}^{n \times n}$ is studied its asymptotic stability analysis.

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Key words and phrases. Prabhakar fractional calculus, Existence and uniqueness, Stability and controllability.

Inspired by the above-cited works, we will investigate the existence and uniqueness of solutions to the system. We will also examine its stability and controllability.

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RELATIVE CONTROLLABILITY OF THE μ -CAPUTO FRACTIONAL DELAYED SYSTEM WITH IMPULSES

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ABSTRACT

In this paper we consider the impulsive fractional delayed differential system with the Caputo derivative with respect to another function. We determine an explicit solution in the light of the available studies in this subject and discuss its existence and uniqueness. we investigate stability and controllability of the given system.

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Key words and phrases. Impulsive fractional delayed system, Existence uniqueness, Ulam-Hyers stability, Relative controllability.

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SOME RESULTS ON DEFERRED CESÀRO STATISTICAL CONVERGENCE OF ORDER α IN THE PROBABILITY SPACES

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ABSTRACT

The idea of statistical convergence, which is a generalization of the concept of convergence and is based on the natural density of positive integers, was first given independently in 1951 by H. Steinhaus and H. Fast ([1],[2]). In 2010, the concept of α -order statistical convergence was considered by R. Çolak [3]. Afterwards the concept of deferred Cesàro statistical convergence was discussed by M. Küçükaslan and M. Yılmaztürk in 2016 [4]. In this study, by considering these two facts, the concept of deferred Cesàro statistical convergence of order α has been discussed in probability spaces.

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**THE USE OF UNMANNED AERIAL VEHICLES IN THE 3D
DOCUMENTATION OF HISTORICAL AND CULTURAL
HERITAGE: THE CASE OF CEYHAN KURTKULAGI
CARAVANSERAI**

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ABSTRACT

In parallel with technological developments, the usage areas of Unmanned Aerial Vehicles (UAVs) have been increasing day by day. As a result of its important contributions to the production of three-dimensional (3D) terrain models, it has reached an important point in the discipline of surveying engineering. Especially in 3D modeling and documentation of historical and cultural heritage, UAVs are advantageous tools in terms of time and cost when compared to classical methods. The aim of this study is to develop a 3D model of the Kurtkulagi Caravanserai, located in the Kurtkulagi town of Ceyhan District of Adana, using UAV and to reveal the importance of UAV in the documentation of this historical structure. In this context, according to a planned flight on the UAV, following the capture of the images of the caravanserai in a multiview aspect, a 3D model was produced as a metric by using photogrammetric methods with the help of software in the laboratory environment.

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A PETROV-GALERKIN METHOD FOR SOLVING THE GENERALIZED EQUAL WIDTH EQUATION

YUSUF TATLISU AND SEYDI BATTAL GAZI KARAKOC

ABSTRACT

This paper is interested in a Petrov-Galerkin method, in which element shape functions are quadratic and weight functions are linear B-splines to solve the generalized equal width (GEW) equation which is a significant nonlinear wave equation as it can be used to model a great many of problems occurring in applied sciences. As the analytic solution of this kind of equation can be obtained hardly, searching the numerical solution of the equation is of enormous importance. In this work firstly, a powerful Fourier series analysis has been applied and it is shown that our method is unconditionally stable. Furthermore, propagation of single and double solitary waves and evolution of solitons are analyzed to demonstrate the efficiency and applicability of the proposed numerical scheme by calculating the error norms L_2 , L_∞ . The three invariants (I_1 , I_2 and I_3) of motion have been commented to indicate the conservation features of the proposed algorithms. Our numerical algorithm is compared with other published methods and shown to be valid and effective.

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A COMPROMISE SOLUTION TO THE MULTI-OBJECTIVE SOLID TRANSPORTATION PROBLEM WITH THE UNCERTAIN PARAMETERS

SEDANUR AKTÜRK AND NURAN GÜZEL

ABSTRACT

In this study, a compromise solution to the multi-objective solid transportation problem (MOSTP), whose supplies, demands, costs, and carrying capacities are uncertain due to globalization and some uncontrollable effects, is examined by considering the satisfactory level of the decision maker. The inverse uncertain normal distribution is used to transform the uncertain parameters in the model into a deterministic model by taking the expected values of the objective functions and the confidence levels of the constraint functions. In order to increase the satisfaction level of the decision maker (DM), a compromise solution for MOSTP is obtained by using the fuzzy linear membership function and the goal programming problem with the upper and lower values in the desired goals of the DM. While the effectiveness of the proposed solution was demonstrated numerically, it is solved by using the MAPLE packet program.

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FRACTIONAL PREY-PREDATOR MODEL WITH LINEAR FUNCTIONAL RESPONSE, PREY REFUGE, FEAR AND CARRY-OVER EFFECT

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ABSTRACT

This paper presents a prey-predator model that incorporates the trait-mediated fear effect and its carry-over effect, as well as the prey defense mechanism of prey refuge. The functional response considered in the model is the Holling-I type. Additionally, to account for memory within the system, we analyze the Caputo fractional order version of the proposed model. The obtained results are also supported by numerical simulations.

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SUBPROJECTIVITY DOMAIN OF FINITELY GENERATED MODULES

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ABSTRACT

In a recent paper [3], a new approach in the study of the classical projectivity was introduced. Subprojectivity domain of module was introduced as a tool to measure the projectivity level of such a module. In this study, we investigated subprojectivity domain of finitely generated modules. Using these domains, we obtained new characterizations of well known rings, such as PP-rings and nonsingular rings. We show that the the class of finitely projective modules is the smallest possible subprojectivity domain of a finitely generated module. We referred to these finitely generated modules as fngp-indigent. We prove that every Noetherian ring has an fngp-indigent module. A ring R is semisimple Artinian if and only if there exists a finitely generated projective fngp-indigent module. We also show that a ring R over which every non-projective finitely generated module is fngp-indigent is either right FGF or right semihereditary.

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**EXISTENCE RESULTS FOR ANTIPERIODIC Ψ -CAPUTO
FRACTIONAL DIFFERENTIAL EQUATIONS WITH
 p -LAPLACIAN OPERATOR**

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ABSTRACT

In this paper we study the existence of solutions for antiperiodic nonlinear differential equations with Ψ -Caputo fractional derivative involving the p -Laplacian operator. The main results of this study are established by using topological degree methods, in particular condensing maps, together with various properties of the Ψ -Caputo fractional calculus and measures of noncompactness. Furthermore, to demonstrate the practical relevance of our theoretical results, we present a non-trivial example at the end of the paper.

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A SOLUTION TO THE SOLID TRANSPORTATION PROBLEM USING LR FLAT NUMBERS

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ABSTRACT

In real life, situations that are not completely known due to uncontrollable causes are frequently encountered. Fuzzy numbers are usually used to represent these unknown situations. In this paper, we suggested a solution to the problem of solid transportation in which supply, demand, and costs are completely unknown and LR is represented by fuzzy numbers, which we demonstrated. We have given an example to illustrate this proposed solution.

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**THE COMPARISON BETWEEN EFFECTS OF
HETEROGENEOUS AND HOMOGENEOUS DOUBLE LAYERED
COMPRESSIBLE ELASTIC MEDIA ON DARK SOLITARY SH
WAVES**

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ABSTRACT

The comparative studies are carried out between the effects of following double layered models on nonlinear evolution of dark solitary shear horizontal (SH) waves: (i) a heterogeneous top layer overlying a heterogeneous bottom layer, (ii) a heterogeneous top layer overlying a homogeneous bottom layer, (iii) a homogeneous top layer overlying a heterogeneous bottom layer, (iv) a homogeneous top layer overlying a homogeneous bottom layer. Both layers are assumed to be isotropic, compressible elastic and heterogeneities of the layers are represented by different exponential functions of the depth. Moreover $c_1\sqrt{1+\alpha_1^2/4k^2} < c < c_2\sqrt{1+\alpha_2^2/4k^2}$ is chosen where c_1, c_2 are linear shear wave velocities, α_1, α_2 are linear heterogeneity parameters of the top and bottom layers, respectively, k refers the wave number and c is the phase velocity of waves. A non-linear Schrodinger equation is obtained for the non-linear modulation of SH waves via a perturbation method. In the case the top layer is thinner than the bottom layer, the effects of the heterogeneity of the two-layers on both nonlinear evolution of dark solitary surface SH waves and variation of the wave profiles are compared.

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ON ANALYTICAL SOLUTIONS OF SPACE-TIME FRACTIONAL VARIANT BOUSSINESQ EQUATION WITH BETA DERIVATIVE

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ABSTRACT

The extended G'/G method with beta derivative is utilized in this study to obtain analytic solutions for the time fractional Variant Boussinesq equation. This equation is transformed into another non-linear differential equation using travelling wave transformations, and the solution is found using the extended G'/G method.

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SPACELIKE f -RECTIFYING CURVES IN MINKOWSKI SPACE

E_1^4

HÜLYA GÜN BOZOK AND ÖNDER KORKMAZ

ABSTRACT

In this paper, spacelike f -rectifying curves are introduced in Minkowski Space E_1^4 and using this definition some characterizations and classifications are researched in Minkowski Space E_1^4 .

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AN INNOVATIVE APPROACH FOR ENHANCING TRAFFIC FLOW: DECENTRALIZED TRAFFIC SIGNAL SPLIT CONTROL METHOD

S.ERGUN

ABSTRACT

Traffic congestion poses a significant challenge in urban areas worldwide, giving rise to a range of issues including economic losses, air pollution, and an increase in traffic accidents. In response to this problem, extensive research is actively being conducted to address one of its key contributors, namely the operation of traffic signals at intersections, with the aim of mitigating congestion. In France, the flow approach to traffic signal control involves the utilization of predetermined control parameters or a centralized control system known as the traffic control system. However, the latter method, encounters certain shortcomings such as limited adaptability to expand or contract the control area and inadequate responsiveness in dynamic environments. This paper proposes a split control method for traffic signals that leverages a split model and an autonomous decentralized control method based on said model to optimize traffic flow. The split model characterizes the relationship between traffic flow and splits through the application of the split balance equation. The results obtained demonstrate the effectiveness of the proposed method in accurately controlling intersections of diverse shapes, while exhibiting a superior ability to smooth traffic flow when compared to the flow control method.

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ADDRESSING THE CHALLENGE OF TRAFFIC CONGESTION: AN INNOVATIVE APPROACH TO OPTIMIZE TRAFFIC SIGNAL CONTROL FOR IMPROVED TRAFFIC FLOW

S.ERGUN

ABSTRACT

Traffic congestion, a pressing issue causing significant economic losses and environmental pollution, demands effective solutions. Extensive investigations have been undertaken to mitigate traffic congestion by optimizing traffic signal control parameters. This research introduces a novel approach employing a dynamic offset control method, leveraging a multi-agent model for wide-area control applicable to diverse road networks. In this method, each intersection within the road network functions as an independent agent, engaging in negotiations with other agents, establishing connections, and forming a tree structure to create a dynamic offset control zone. Within this tree structure, agents execute green wave control based on traffic conditions at the boundaries. To assess the efficacy of the proposed method, evaluations are conducted using both a grid-like road network and a realistic road network constructed within a simulation environment. The results demonstrated that the method can dynamically and adaptively establish green waves aligned with traffic conditions, resulting in a remarkable enhancement of traffic flow. Mitigating the adverse effects of traffic congestion holds immense significance, and this innovative approach holds great promise in facilitating efficient traffic flow.

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ROBUSTNESS CONTROL CIRCUIT FOR LOGIC CIRCUIT INTEGRATIONS WITH PIC AND ARDUINO MICROCONTROLLERS

MEHMET ERSİN AYTEKİN AND DÖNAY KAYAHAN

ABSTRACT

In the presented study, the robustness control of logic circuits, which is an important laboratory study in the field of electrical-electronics education, was carried out. Logic circuit studies are one of the important laboratories for Electrical-Electronics education. Because integrated circuits are in a closed package, it is difficult to determine their robustness by their external appearance. Therefore, it is necessary to develop a new approach for robustness control of logic circuits. In this study, two different electronic circuit designs were carried out using PIC16F877A microcontroller and Arduino microcontroller. By analyzing these designs in terms of performance, cost and convenience, a circuit that provides optimum performance and control of logic circuit ICs has been determined. In this study, two different electronic circuits are designed and analyzed with PIC 16F877A microcontroller and Arduino microcontroller, which perform the robustness control of logic circuit ICs.

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A DYNAMIC APPROACH TO THE EFFECT OF HARVESTING

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ABSTRACT

Comprehending the dynamics of the predator-prey models first modelled by Lotka [1] and Volterra [2] has a significant role in investigating multiple species interactions. Recently, many researchers have been increasingly interested in introducing the term harvesting in predator-prey models to make them more realistic [3]. One of the harvesting types suggested in the literature is constant yield harvesting, which is defined as the biomass harvested regardless of population size. In this study, different from the constant yield harvesting effect, we consider the model subject to the harvesting effect on the predator population.

By adding the harvest parameter to a predator-prey model, the considered model has been made more realistic. Then, and it has been made qualitative behavioural analysis, which includes examining the behaviour of predators when searching for and hunting their prey. In other words, the interaction of predators with their prey and the effect of predator behaviour on prey populations have been discussed. Also, numerical analysis has been used to confirm the theoretical results.

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SIMPLE WAYS FOR OBTAINING TRANSFORMATION MATRICES OF SERIAL MANIPULATORS

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ABSTRACT

In this paper, a transformation matrices module was presented to obtain overall transformation matrices in position analysis of serial manipulators for Denavit-Hartenberg Method with Mathematica Software. In addition to this module an extra Mathematica code was given which is written by ChatGPT. At the end of the study, a comparison of the two methods was made.

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**MEASUREMENTS AND EVALUATION OF ELECTRIC FIELD EXPOSURE
GENERATED BY MODEM IN HOME ENVIRONMENT**

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ABSTRACT

In the home environment, we have the opportunity to access the Internet, both with computers and mobile phones, thanks to the possibilities offered by the modem. Therefore, in this study, Spectran HF-60105 device was used to determine the electromagnetic field exposure values due to these modems and to find out where these values correspond to the limit values determined by the competent committees. The device is set to save 4236 power values in its memory in a 24-hour period. The Omnilog 90200 antenna (probe), which is in the working band (750-2500MHz), is attached to the device, especially when measuring the electromagnetic field values originating from GSM. The recorded power values were converted into electric field values and the variation of both power and electric field with the number of measurements was plotted using MATLAB. The curve that gives the smallest error in the MATLAB environment was fitted to the change of the electric field values, and the two of them were plotted on the same plane depending on the number of measurements, and the equation, coefficients and statistical values of the curve were obtained. In addition, the intensity and cumulative functions of the electric field values are plotted. The electric field values recorded during the measurement are 61 V/m 25 times the limit value determined by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) for an environment, and 45.75 V/m determined by the Information and Communications Technologies Authority (ICTA), the limit value has been exceeded 66 times.

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Key words and phrases. Icnirp, Icta, Spectran HF 60105, Modem, Omnilog 90200

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AN ENCODING -DECODING ALGORITHM BASED ON NARAYANA NUMBERS

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ABSTRACT

In this study we present an encoding/decoding algorithm using Narayana numbers. We use the Narayana Q -matrices applying them into matrices which are blocks. By using this method, we get different keys and messages. This process aims to not only increase the reliability of information security technology, but also to provide the ability to verify information at a high rate.

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APPLYING THE ARTIFICIAL BEE COLONY ALGORITHM: ENHANCING THE EFFICIENCY OF A HYDROGEN-BASED HYBRID RENEWABLE ENERGY SYSTEM

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ABSTRACT

Hydrogen, as a clean energy resource, has the potential to alleviate impending energy shortages and environmental issues. Owing to its plentiful renewable energy resources, Turkey is advantageously positioned to fulfill its electricity requirements. In rural locations where the energy grid is either unavailable or excessively costly, Hybrid Energy Systems (HRES) integrating multiple energy sources are employed. While HRES offer an economical solution custom-fit to distinct power needs and techno-economic circumstances, the aspects of their management, sizing, and component selection present notable difficulties. This study aims to develop, simulate, and evaluate a hybrid system composed of wind, solar, biomass gasifier, and fuel cell components. It also addresses optimization algorithms related to the management of energy flow and optimal sizing of renewable energy sources. In HRES, the surplus energy undergoes conversion into hydrogen, which is then stored and harnessed in fuel cells during instances of overproduction. The primary objective in the optimization process is to minimize the Annual Total Cost (ACS). The decision variables include the power output of solar panels and wind turbines, as well as the quantity of hydrogen tanks. A hybrid optimization method, based on the Artificial Bee Colony (ABC) algorithm, is implemented to determine the optimal dimensions of the HRES components. Consumption and weather data from 2022 are employed to design a hybrid system capable of fulfilling all energy demands at the lowest possible cost. Simulations suggest that the proposed off-grid hybrid energy system is the most cost-effective choice for the selected location. The ABC algorithm identifies the optimal system configuration, which incorporates a 358.08 kW wind turbine, a 2551.69 kW solar panel, and 636 hydrogen storage tanks. The system's annual total cost is $\$3.1189 \times 10^6$, its net present cost is also $\$3.1189 \times 10^6$, and its levelized cost of energy is 1.2300 $\$/\text{kWh}$. The energy produced by the system is entirely renewable, with 53.53% from solar, 0.57% from wind, 12.23% from fuel cells, and 33.67% from a biomass generator. The optimization algorithm was implemented using the MATLAB 2022b simulation software.

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Key words and phrases. Artificial Bee Colony Optimization Algorithm, Metaheuristic Optimization Algorithm Techniques, Hydrogen, Fuelcell, Electrolyzer, Energy Management.

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INTERACTION BETWEEN RET PROTEIN KINASE AND CURCUMIN AND RESVERATROL: A MOLECULAR DOCKING PERSPECTIVE

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ABSTRACT

Medullary thyroid carcinoma (MTC) is a neuroendocrine tumor derived from the C cells of the thyroid gland and accounts for approximately 5% of all thyroid carcinomas [1]. A significant number of MTCs have an up-regulated RET tyrosine kinase activity. Cabozantinib have been used against medullary thyroid cancer, however, the mutant variants of RET are known to be resistant to cabozantinib. In this study, using AutoDock tools [2] and Vina [3], the interactions of curcumin and resveratrol with both wild type and mutant variants of RET protein kinase were evaluated via molecular docking. V804M and V804L mutant variants were assessed in this study. The binding free energy between cabozantinib (reference drug) and wild type RET was found to be -10.3 kcal/mol. However, the binding energy between cabozantinib and V804L and V804M RET variants were computed to be -10.3 and -9.5 kcal/mol. Nevertheless, the binding energies between curcumin and RET variants were shown to be -8.3, -8.2 and -8.1 kcal/mol for wild type, V804L and V804M variants, respectively. In the meantime the binding energy between resveratrol and RET variants were found to be -8.7, -8.4 and -8.2 kcal/mol for wild type, V804L and V804M variants, respectively. These data suggest good binding affinity of curcumin and resveratrol to RET variants. In conclusion, curcumin and resveratrol could be good candidates in the management of medullary thyroid carcinoma and other cancer types related to RET protein.

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Key words and phrases. MTC, Molecular docking, curcumin, resveratrol.

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**A LITERATURE SURVEY BASED ON THE TABU SEARCH HEURISTIC METHOD FOR
THE SOLUTION OF THE MULTI-DIMENSIONAL AND MULTI-OBJECTIVE
KNAPSACK PROBLEM AND VARIATIONS**

G. G. GÜNER

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ABSTRACT

The Knapsack Problem is a classic operations research problem, and it is mathematically in the class of combinatorial optimization. It is among the most famous NP-hard problems in terms of solution algorithm. The Knapsack Problem can be applied in different real-life decision-making processes. For example, choosing an investment/portfolio and asset selection for the asset-backed securitization are some of them. This problem with different real-life application areas can turn into different types of problems (i.e., bounded knapsack problem) according to different limitation situations. Different heuristic solution approaches can be used to solve the problem. Tabu Search stands out as one of these solution approaches. Tabu Search is a heuristic method to guide local search methods and to find the best or near-best solutions for combinatorial optimization problems to get rid of local best solutions. Tabu Search has been successfully applied to many areas such as transportation, facility layout, expert systems, neural networks, telecommunications, and scheduling. Tabu Search has basic components called initial solution, mechanism of action, candidate list strategies, memory, tabu breaking criteria, and ending conditions. In this study, a literature search based on the Tabu Search heuristic method was conducted to solve the knapsack problem and its variations. The studies in the literature, especially in recent years, have been examined and compared in detail. The proposed study is intended to guide decision-makers about the application methodologies of the Tabu Search heuristic method for solving the knapsack problem and its variations.

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2000 Mathematics Subject Classification. Primary 90C27; Secondary 68T20.

Key words and phrases. Knapsack problem, Combinatorial optimization, Tabu search.

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NUMERICAL INVESTIGATION OF THE THERMAL PERFORMANCE OF A LIQUID COOLED BATTERY PACK

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ABSTRACT

In this study, liquid-cooled active battery thermal management system (BTMS) with cold plate is investigated numerically for 18650 cylindrical li-ion battery pack arranged in a 2x6 layout. For this purpose, three different configurations of the BTMS and different volume flow rates (0-1 l/min) are studied under 2C discharge rate. The first configuration (Model I) refers to double sided cooling, the second configuration (Model II) refers to the single sided cooling, and third configuration (Model III) refers to both single sided cooling and aluminum block cooling. Numerical studies are conducted with ANSYS Fluent, and the highest temperature in the battery pack, the highest temperature difference between the cells, the cooling efficiency, pressure drop in cold plate and the energy density of the battery pack are compared for different configurations. The results show that the highest temperature in battery pack and the highest temperature difference between the cells decrease with the increase in flow rate. However, after 0.5 l/min, further increase in flow rate has no obvious effect on cooling performance. Moreover, the pressure drop in the cold plate increases with the increasing flow rate. Therefore, 0.25-0.5 l/min are considered as the optimum flow rates among these three configurations. Comparing three configurations, Model III is the optimum configuration, especially considering the highest temperature in battery pack and the highest temperature difference between the cells.

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Key words and phrases. Li-ion battery, CFD, Thermal behavior, Liquid-cooled, Battery thermal management systems (BTMS).

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CORPORATE CARBON FOOTPRINT CALCULATION AND EVALUATION OF MERSIN UNIVERSITY ÇİFTLİKKÖY CAMPUS

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ABSTRACT

The increasing greenhouse gases present in the troposphere layer, which is located on average eleven kilometers above the atmosphere in our world, and global warming threaten the continuity of the entire ecosystem. In particular, the increase in the use of fossil fuels, the increase in the number of population every day, industrialization and deforestation are all activities that increase global warming by increasing the amount of greenhouse gas emissions. Natural disasters caused by global warming and climate change complicate the life activities of all living things. Recently, increasing to prevent changes in the climate system and thus, if it is to continue in the future the increase of natural disasters, drought, seasonal changes, change in extreme temperature difference Day and night on earth as the change in the amount of naturally occurring gases vital to live with the results, it is envisaged that this will not be a world for 50 years. On an international scale, which is one of the most important environmental problems-climate change, due to all organisms affect all national and international institutions and organizations should do their part. Developed and developing countries in order to prevent the creation of a new energy policy, climate change, carbon emissions and thus the necessity for the provision of a sustainable environment by maintaining a minimum level of the United Nations and is important for studies is located. In order to obtain results in the studies carried out, the expression of carbon footprint appears. Carbon footprint is the indication of greenhouse gas emissions released into the atmosphere as a Tue of activities in terms of carbon dioxide. Mersin University Çiftlikköy Campus has a very important position in the greenhouse gas emission emitted in Mersin province in terms of the area it covers in Mersin province and the excess of the human population. For this reason, in this study, Mersin University Çiftlikköy Campus Corporate Carbon Footprint Calculation was performed. In the calculation, the amount of carbon dioxide released by using the natural gas consumption data of the campus related to heating for the year 2022, electricity consumption, vehicles belonging to the university and fuel consumption Tues of vehicles entering the campus were calculated. The calculations also revealed a total of 23,614 tons of CO₂e, which accounts for 73.7% of greenhouse gas emissions in Scope 3, including other indirect emissions related to campus entry, academics, guest vehicle fuels, and minibuses. This quantity represents the amount of carbon dioxide emitted from fuel. The annual fuel consumption of vehicles owned by the Rectorate, as well as the natural gas consumption for heating, are classified as direct emissions in Scope 1. They have been calculated to be 1,132 tons of CO₂e. Additionally, Scope 2 indirect greenhouse gas emissions, resulting from electricity consumption, have been estimated to be 5,060 tons of CO₂e.

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Key words and phrases. Global Warming, Greenhouse Gas Emissions, Carbon Footprint, Climate Change, Mersin University.

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PROCESS IMPROVEMENT WITH VALUE FLOW MAPPING METHOD FOR LOW DENSITY POLYETHYLENE RECYCLING PROCESSES

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ABSTRACT

In today's competitive conditions, businesses have to be customer-oriented in order to survive. Competitive conditions require being dynamic while being open to innovation, change and continuous improvement. Customer orientation, on the other hand, aims to meet customer needs and even go beyond their expectations. In this direction, businesses are trying to shape production according to production systems that will keep up with competition conditions. Lean manufacturing systems that meet these goals are a value-oriented system that contributes to production and aims at continuous improvement. The aim of this study is to investigate the concept of value stream mapping within the scope of lean manufacturing and to evaluate the results by applying value stream mapping to low density polyethylene recycling processes. As a result of these data, it is aimed to draw the future situation map according to the result of the improvement studies planned after the current situation of the enterprise and to analyze the difference between the two maps and to make the necessary improvements with lean production techniques. Lean manufacturing techniques are frequently used by companies that want to reduce their costs and increase their quality and performance. In the application part of this study, in a business that has difficulties in preparing its orders on time, has problems such as excessive production errors and low production line efficiency, it is aimed to identify the waste sources on the way to lean production, by using the value stream mapping method, by taking into account the known or unknown wastes. With lean manufacturing techniques, it is aimed to identify where the problem is and to find possible solutions for improvement. Accordingly, the current value stream mapping study was carried out in the plastics industry that produces granule raw materials. There are sorting, crushing and washing, whisking and squeezing, extrusion and packaging activities in the process until the output of the product, whose inputs are made with raw material, labor and energy. Working 6 days a week, 3 shifts, 8 hours per shift. The weekly production amount of the company, which has a daily networking time of 22.5 hours, is observed as 37,500 kg. In the light of this basic information, value-creating and non-value-creating activities provide a map showing the steps that do not add value to the final product with the value stream mapping method, which is one of the lean manufacturing techniques. With the future situation map, scenarios are developed and improvements are determined. In this study, it contributes to the provision of necessary solutions to prevent possible errors in low density polyethylene recycling processes and to provide competitive conditions.

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Key words and phrases. Lean manufacturing, value stream mapping, low density polyethylene, process improvement

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**INVESTIGATING SOLITARY WAVE SOLUTIONS OF THE BENJAMIN-ONO
EQUATION FOR MODELLING INTERNAL WAVES
IN DEEP WATER**

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ABSTRACT

In this study, the Benjamin-Ono equation, which is physically very important in modelling internal waves in deep water, is investigated. The Benjamin-Ono equation was introduced by Benjamin and Ono in 1967 and 1975, respectively. Travelling wave solutions are generated by selecting a suitable analytical method for the Benjamin-Ono equation. Graphs of solitary waves have been obtained by numerically describing the physical quantities in travelling wave solutions are presented and analysed. The difference of the obtained solitary wave solutions from the solutions in the literature has been emphasized and the effects of the chosen analytical method on the traveling wave solution are discussed in terms of analysis and applied mathematics.

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A REVIEW ON LATEST DEVELOPMENTS IN ASSEMBLY AND TEMPORARY SHELTERS FOR NATURAL DISASTERS

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ABSTRACT

Assembly and temporary shelter areas are spaces that allow people to stay in safe zones following a disaster. Therefore, studies related to assembly areas and temporary shelters, particularly within the framework of natural disasters, are of great importance. This article examines the efforts concerning assembly areas, temporary shelters, and evacuations during a natural disaster process. The purpose of this review is to identify challenges, provide a research gap, and propose potential research directions for the future. The motivation behind this study stems from the increasing number of natural disasters in recent years due to climate change and the need for ideas to ensure the well-being of disaster victims and regional authorities. For the first time, this study reviews the literature on assembly areas and temporary shelters regarding natural disasters over the past three years. Finally, following the analysis of the reviewed studies, some potential options for future research are suggested.

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A NEW APPROACH FOR SCORE FUNCTION ON Q-RUNG ORTHOPAIR FUZZY SETS

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ABSTRACT

Q-rung orthopair fuzzy sets are a generalization of intuitionistic fuzzy sets and pythagorean fuzzy sets. They are very useful tools for dealing with uncertain information. The score functions of this set play an important role in comparing such data with each other. However, current score functions have some drawbacks that lead to unreasonable and indeterminate results. In this paper, we introduce a new type of score function that fixes these defects.

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BIOFUEL UTILIZATION IN THE AVIATION INDUSTRY

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ABSTRACT

In this century, when we are struggling with global warming and its effects, scientists are considering many solutions, especially finding alternatives to fossil fuels. It is known that fossil fuels increase CO₂ emissions, cause greenhouse gas problems and environmental pollution. The transportation sector is considered a major polluter producing high amounts of CO₂. For example, the aviation industry produces a significant amount of greenhouse gas emissions, and it was stated in the study of ICAO in 2016 that if there is no intervention until 2050, the emissions from aviation could increase by 300-700% (ICAO Environmental Report, 2016). Since the aviation industry accounts for 2% of the total CO₂ emissions worldwide, it has been stated that international aviation organizations aim to achieve carbon neutral growth from 2020 and reduce their emissions by 50% by 2050 compared to 2005 levels (Icao Resolutions Adopted by The Assembly, 2016).

Therefore, clean and environmentally friendly renewable energy sources are evaluated to meet energy demands and provide zero or nearly zero air pollutant emissions (Qazi et al., 2019). Electric or hybrid car technologies have started to be developed and used as an alternative to fossil fuels in land transportation. Rendón et al. (2021) stated that the hybrid electric propulsion system is an evolution for small airplanes in airports with small runways in commercial applications. However, the source of electricity is another problem related to environmental issues.

Biofuel, which is an effective alternative renewable energy source, is a solid, liquid, or gaseous fuel extracted from biomass (Braun et al., 2008). Biofuel production has faced an increasing demand in recent years. About 3.4% of road transport is covered by biofuels. Most of the biofuel production belongs to Brazil. In general, Brazil is followed by the United States and then the European Union countries in biofuel production (Ho, et al., 2014). Although all-electric and hybrid-electric aircraft will transform the market in the future, noise, emissions, fuel consumption, and flight range will remain critical issues. Nevertheless, it is necessary to continue to contribute to the research on aviation biofuels used today. The utilization of biofuels in the aviation sector could have a significant effect on solving environmental problems. In this study, biofuel utilization and its effects on the aviation industry were investigated and evaluated. Figuring out the potential of biofuel as an alternative to fossil fuels in the aviation sector was also discussed in detail. The roadmap and suggestions were included to the discussion.

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Key words and phrases. aviation sector, biofuel, renewable energy

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INVESTIGATION OF CONVECTION HEAT TRANSFER COEFFICIENT EFFECTS ON THERMAL ENERGY STORAGE PERFORMANCE WITH PCM/GRAPHITE MATRIX

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ABSTRACT

PCM-based thermal energy storage systems provide an effective means of capturing, storing, and releasing thermal energy. Their high energy storage density, temperature control capabilities, and contribution to sustainable energy practices make them a promising solution for optimizing energy utilization and reducing environmental impact. However, their low thermal conductivity values significantly limit their usability. Integration of PCMs with graphite matrix can significantly improve thermal conductivity, thereby enhancing energy storage efficiency. The main focus here is to ensure the effective maintenance of thermal energy and minimize energy losses by contributing to the development of more sustainable energy storage solutions. In this work, a numerical study has been conducted to predict the effect of environmental conditions on the thermal energy storage performance of graphite matrix saturated with PCM (paraffin) for solar thermal energy and waste heat recovery, including different convection heat transfer coefficient values of 0, 5, 10, and 50 W/m²K, which refer to adiabatic, natural convection/still air, forced convection with fans (air conditioning), and windy weather, respectively. The effect of the convection heat transfer coefficient is evaluated for different bulk density values of 100 kg/m³ and 143 kg/m³. Results indicated that uniform melting behavior was observed in the PCM/graphite matrix composite due to the high porosity of graphite, which allowed a dominant conduction heat transfer mechanism, and energy storage rates climbed with the increase in bulk density. Higher heat transfer coefficient values cause a higher total melting time and lower thermal energy storage rates. The effect of the convection heat transfer coefficient on total melting time is appreciable for 50 W/m²K compared to lower h values for each bulk density. The effect of the convection heat transfer coefficient is lower for a higher bulk density of 143 kg/m³. On the other hand, the effect of bulk density on the energy storage rate is maximum 9% for lower convection heat transfer coefficients (<50 W/m²K), while the impact level of bulk density increases to 15% at 50 W/m²K.

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Key words and phrases. Thermal energy storage, melting, composite PCMs, convection heat transfer coefficient, numerical

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INVESTIGATION OF THE EFFECT OF NANOPARTICLE ADDITIVES ON THE REFRACTIVE INDEX AND DENSITY OF GASOLINE

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ABSTRACT

In this study, the use of Al₂O₃ and TiO₂ nano particles with a size of 12 nm and a purity of 99.9% as gasoline fuel additives was investigated. The density and refractive index values of fuel mixtures with particle additives were compared to pure gasoline fuel. Fuel mixtures were prepared using a 3-level factorial design technique, and density and refractive index values were determined. The results showed that the Al₂O₃ nano particles, due to their high surface area, increased the density by 0.17% (3.5 ppm) and 1.22% (7 ppm), while TiO₂ nano particles increased the density by 0.22% (3.5 ppm) and 1.26% (7 ppm). It was observed that the nano particle with a higher surface area had a less significant effect on density. The refractive index values decreased by 0.11% (3.5 ppm) and 0.14% (7 ppm) for Al₂O₃ nano particles, and by 0.21% (3.5 ppm) and 0.24% (7 ppm) for TiO₂ nano particles. This study highlighted the importance of particle size, purity, and surface area in the selection of nano particles. Based on the evaluations and preliminary tests, nano particle levels above 15 ppm exhibited a tendency for agglomeration in the fuel. It is crucial to limit the total concentration to 15 ppm, especially for nano particles with a high surface area like Al₂O₃, to achieve homogeneous fuel.

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Key words and phrases. Nano Aluminum Oxide, Nano Titanium Dioxide, Gasoline Additive, Refractive Index, Density

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EFFECT OF DIFFERENT BUILD ORIENTATIONS ON MECHANICAL PROPERTIES OF PARTS IN ADDITIVE MANUFACTURING TECHNOLOGY

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ABSTRACT

With the developing technology, additive manufacturing productions are frequently preferred in various industrial applications such as automotive, defense industry, aerospace, and biomedical. It is very advantageous in terms of both production speed and obtaining the desired production model by enabling production with layers despite the geometric complexity of the model to be produced. The production of the models to be produced in the form of layers causes changes in the mechanical properties of the structures. The main influencing parameters are layer thickness, build orientation, production direction, and layer geometry. This study aims to experimentally determine the mechanical differences that the layer orientation angle will create in the structure. Standard tensile samples were produced by UV Stereolithography method, one of the additive manufacturing technologies. A commercial polymer-based liquid resin was used to produce tensile specimens positioned at 0°, 30°, 45°, and 90° angles. Stress-Strain curves of each sample were obtained by tensile tests at constant tensile speed. The mechanical properties of the tensile specimens produced at an angle of 45° showed the lowest mechanical performance compared to the other specimens. The reason for this is that the layers are combined with each other at 45°, where the maximum shear stress in a geometry occurs. Layer mergers corresponding to the shear plane showed lower strength, resulting in an earlier fracture of the specimen. Considering the experimental results, it is seen that the structure orientation directly affects the mechanical properties.

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**ELIMINATION OF ACTUATION SINGULARITIES OF KINEMATICALLY
REDUNDANT RPR-RPRR PLANAR PARALLEL ROBOTS**

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ABSTRACT

Parallel robots are used in a wide range of applications in industry and medicine. This wide range of applications is due to their many advantages, such as high accuracy, high rigidity, and high load capacity. On the other hand, parallel robots have a complicated singularity problem as their main drawback. The most critical singularities are Type II or actuation singularities. This paper studies the elimination of actuation singularities of kinematically redundant RPR-RPRR planar parallel robots.

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INVESTIGATION OF THE CAPACITY FACTOR OF THE EGE REGION WIND POWER PLANTS ACCORDING TO THE REAL PRODUCTIONS

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ABSTRACT

With the developing industry and technology, the need for energy has also increased. Meeting the increasing energy demand from renewable energy sources is encouraged by the states. In the last 10 years, Turkey has prepared many incentive packages in this field by turning to domestic and national resources in the energy sector. Before the installation of renewable energy power plants, some criteria of the facility should be investigated and analyzed. The feasibility studies carried out before the investment in wind power plants allows optimum operation of existing resources and maximum benefit from these resources. In addition, financial and technical issues (depreciation period, turbine selection, etc.) can be predicted according to the feasibility study. This study aims to obtain information about the capacity factor of the region and the provinces in the region by using the real production of 86 facilities in the Ege region. For this purpose, the provinces' annual average, maximum, and minimum capacity factors were calculated according to the facilities' production in the Ege region in 2022. According to the calculations, the annual average capacity factor of the Ege Region is 34.4%. The average annual capacity factors of İzmir, Manisa, Aydın, Muğla, Uşak, Denizli, and Afyonkarahisar provinces were calculated as 39.9%, 38.6%, 32.8%, 33.9%, 29.3%, 34.5%, and 31.8%, respectively. According to all these results, it is predicted that it will be beneficial for the investor to give priority to İzmir in site selection for the new facilities to be established in the Ege Region.

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Key words and phrases. Wind Energy, Capacity Factor, Ege Region

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A HYBRID DEEP REINFORCEMENT LEARNING ALGORITHM APPLICATION FOR VEHICLE ROUTING PROBLEM

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ABSTRACT

Vehicle Routing Problem attempts to determine the optimal routes for a fleet of vehicles to deliver demanded needs to customers, considering the changing requirements and uncertainties in the transportation environment. In this study, developing a hybrid solution algorithm using deep reinforcement learning approaches and metaheuristic algorithms that are suitable for the problem is considered. At first, a constructive heuristic algorithm is used to generate an initial solution. Then, a double deep Q network-based deep reinforcement learning and a simulated annealing algorithm work collaboratively. The computational result shows that the proposed algorithm is promising in routing optimization.

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ON RELIABILITY ANALYSIS OF REFERENCE INTERVALS IN MEDICINE

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ABSTRACT

Fuzzy logic has several practical applications in the world of medical data. Reference ranges is just one of them. It is one of the most significant aspects that influences how doctors decide how to diagnose and treat patients. Therefore, in terms of diagnosis and therapy, the precision of these intervals is crucial. This paper presents a method for testing interval reliability in accordance with fuzzy logic data.

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Key words and phrases. Entropy, Reference Range, Fuzzy set

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CARBON FOOTPRINT CALCULATION AND MITIGATION STRATEGIES FOR THE TRANSPORTATION AGAINST CLIMATE CHANGE: PESTEL ANALYSIS

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ABSTRACT

With the awareness of the disasters that will be caused by greenhouse gas and therefore climate change, important developments are taking place in the agenda of countries for the solution of the problem, and they aim to reduce the greenhouse gas emissions they release for a sustainable world. The source of the increase in greenhouse gas intensity is attributed to the increase in the CO₂ rate in the air, and the main factor in the increase of the CO₂ rate is the burning of fossil fuels and human activities, while the starting point of the emission reduction targets of the countries can mostly be the transportation sector. Because a significant part of greenhouse gas emissions is from transportation. For this reason, reducing carbon emissions in the transportation sector is an important issue and constitutes the aim of the study. Carbon emission is a measure of the damage done by human activities to the environment in terms of the amount of greenhouse gases produced. For this reason, a carbon footprint study for the transportation network was applied by selecting the pilot region of Mersin province Yenışehir district in the study. Considering that unmeasurable parameters cannot be managed, as a first step, bus, private vehicle, minibuses, sea transportation etc. in the transportation network. emissions are taken into account. Carbon emission values were calculated through the Co2nectorPro software and the resulting values were compared with the studies in the literature, and the stage of developing a district-based strategy for the transportation sector was started. Strategies that can contribute positively to urban sustainability have been developed with the help of PESTEL analysis within the framework of sustainability. It is desired that the study, in which greenhouse gas emissions are expressed in terms of carbon dioxide, and which includes different strategies such as reducing fuel consumption in reducing carbon footprint, developing alternative fuel types, sustainability activities and working on fuel savings, will be an important sharing tool across the city and across the country. Within the scope of sustainability, the study has an important potential as it will contribute positively to climate change by aiming to reduce carbon emissions.

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Key words and phrases. Carbon footprint, climate change, PESTEL analysis, process improvement

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THE EFFECTS OF COLLECTOR PLATE MATERIAL ON FIBER FINENESS IN ELECTROSPINNING

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ABSTRACT

In the electrospinning method, polymer fibers with nano diameters are obtained from the polymer solution with the effect of the electric field. In the study, nanofibers were produced from polyacrylonitrile (PAN) solution using a needle electro-spinning device. An electrostatic field was created between the polymer solution drop at the needle tip and the metal collector plate. The applied voltage caused the polymer solution drop to be sprayed from the needle. Due to the electrical forces, the solution drop elongated and became a very fine fiber, accumulated on the collector, and a very long, randomly distributed fiber network was obtained. There are many parameters that affect the electrospinning method. The collector plate material is one of these parameters. The aim of this study is to compare the diameters of the fibers obtained by using metal plates of different materials as collectors. For this purpose, circular shaped, 1 mm thick aluminum, copper, brass and stainless steel plates were used as collectors. This study differs from other studies in terms of using multi-materials. The diameters of the obtained nanofibers were measured by scanning electron microscopy (SEM). SPSS program was used to compare the diameter values statistically. The thinnest fibers were obtained statistically with the copper plate collector, and the thickest fibers were obtained with the stainless steel plate collector. The conductivity of copper is higher than aluminum, brass and stainless steel. The conductivity of stainless steel is lower than other materials used. It was observed that finer fibers were obtained as the conductivity increased. It is thought that the nanofibers become thinner as a result of further elongation of the polymer jets with increasing conductivity. Thus, it has been observed that the collector plate material affects the fiber fineness, and as the material conductivity increases, finer fibers can be obtained.

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Key words and phrases. Electrospinning, Collector plate material, Nanofiber fineness, PAN.

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PRODUCTION OF SUCKER ROD AND DETERMINATION OF ITS MECHANICAL PROPERTIES AND LOCALIZATION OF THIS PRODUCT

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ABSTRACT

Generally, oil wells in the early stages of their life naturally flow to the surface and are referred to as flowing wells. Flowing production means that the pressure at the bottom of the well is sufficient to overcome the sum of the pressure losses along the flow path to the separator. When this criterion is not met, natural flow ceases and the well dies. In this case, artificial lift methods are used.

There are various lifting mechanisms available for the production engineer to choose from. One group of commonly used artificial lift methods uses a type of pump placed below the fluid level to increase the pressure of the well flow to overcome pressure losses along the flow path. Other lifting methods use compressed gas injected from the surface into well tubing to help bring well fluids to the surface.

In this study, the necessary researches for the production of Sucker Rod "Oil Pumping Shaft", which was realized for the first time in our country by using the rod type pumping method among the pumping methods among the artificial lifting mechanisms, were carried out and manufactured. After the conceptual process setup of the production process was completed, a work order was issued and the production of our products started. Especially in mold design, the final mold design was carried out with mold revision studies after the initial design in order to ensure the repeatability that will ensure the continuity of quality in production. Raw material acceptance, hot forging in a horizontal press, normalized heat treatment, machining and threading, quality control and laboratory processes, sandblasting and coating were carried out to reach the final product. Within the framework of the quality control plan, the quality of the products was guaranteed by destructive non-destructive inspections after the relevant processes. With this work, an application was made for API certification and a product was localized as the 11th country with this certificate.

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Key words and phrases. Oil, manufacturing, design, sucker rod

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DETECTION OF EFFECT OF SMART ROBOT AUTOMATION ON QUALITY AND EFFICIENCY IN PRODUCTION

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ABSTRACT

In this study, an industrial robot system and its sub-equipment, which can control two CNC machining centers at the same time, CNC part insertion, removal and part transfer to the fully automatic control system, and transfer of finished parts to the smart pallet system, were installed and trial productions were carried out. Thanks to this application, which sets an example for the sector and the region, it has become possible to realize more efficient, high quality and error-free productions under heavy working conditions. During the installation and trial productions, support was received from technical experts and 4 experts were trained in this field.

Within the scope of the study, the effects of intelligent robot automation on quality and efficiency in production were examined. Although there was no change in the machining times of the part on our CNC machining machines, the total cycle time was improved by 17% thanks to the assembly and disassembly of the part with industrial robot systems. The industrial robot system communicates with the CNC as soon as the machining of the part is completed, allowing the new part to be installed. Mounting and dismounting operations can be performed in communication with the CNC without any loss of time. With the communication of objects between the machines, our line has been able to operate fully automatically and efficiently. Break times of 1.5 hours have been eliminated with the fully automatic line. Within the 1 minute cycle time, the time for attaching and removing parts, which takes 15 seconds, has been reduced to 10 seconds. Material waiting times have been eliminated. Work transition times, which cause a loss of 1.5 hours per day, which is 30 minutes on average for each shift, have been reduced by 67%. Total waiting and downtime of the machines was reduced from 3 hours to 1 hour. In this way, in line with the 41% improvement in productivity, the daily production capacity was increased from 585 to 715 units for a single machine. Thus, a 22% increase in production capacity was realized during CNC machining, which is a critical process of our company. All parts are 100% controlled with the fully automatic measurement control system provided in our work. With our project, measurement controls can be carried out fully automatically according to the desired quality standards without any disruption in production. Accordingly, our labor costs have been significantly reduced in the relevant process.

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Key words and phrases. Industrial automation, quality, productivity, smart manufacturing

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R58-03 APPLICATION IN ALUMINUM CHASSIS

MUSTAFA YILMAZ, AKIN ZENGİN, ONUR CAN KIRIT and NECİP AHMET KÖROĞLU

ABSTRACT

Due to the globalization of the world, logistics constitutes an important part of our lives. The importance of the supply chain emerges in any crisis. The consequences of disruptions in the supply chain will be very severe. This harms both users and companies. Apart from this, the safe use of highways is important not only for the supply chain but also for preventing losses in traffic accidents. There are certain conditions to minimize the consequences of these accidents. The procedures for the registration of vehicles following the legislation are called homologation. Technical regulations of vehicles according to United Nations/Economic Commission for Europe (UN/EEC) are called regulations^[1] The tools used in the supply chain differ according to their shapes. These can be counted as trailers, trucks, dumpers, and tankers. The types of vehicles we will use also vary according to the load we will carry; can be classified as solid, liquid, or gas. The vehicle on which we will develop in this study is an aluminum fuel tanker with a capacity of 40,000 liters. It is about the change made in the rear bumper of the aluminum fuel tanker and the results of this change and the effect of these results on the vehicle. This change had a positive effect on the regulation and vehicle load-carrying capacity. As a test, ANSYS structural static analysis was performed. S355 structural steel and 5083 H111 aluminum alloy were used as the model. The number of points in the model mesh structure was applied as 66983 and the number of elements as 65860. Boundary conditions were applied from the 250mm wide region, starting at 400mm from the midpoint of the force buffer.

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A PERFORMANCE ANALYSIS COMPARISON OF MACHINE LEARNING ALGORITHMS IN DETECTION OF HEART DISEASE

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ABSTRACT

Cardiovascular diseases are one of the leading causes of death worldwide. Approximately 31% of deaths in the world are due to these diseases each year. 4 out of 5 deaths from cardiovascular disease are due to heart attacks and strokes. About a third of these deaths occur in people under the age of 70. Heart failure is a common fact caused by cardiovascular diseases.

In this paper, it is aimed to determine the individuals with heart disease beforehand by comparing the performance analysis of some machine learning algorithms. The dataset used in this study has been provided from the website <https://www.kaggle.com/datasets/fedesoriano/heart-failure-prediction>. 5 heart datasets were prepared by combining over 11 common features, making it one of the largest heart disease datasets ever available. Totally 1190 different observations were made from 5 heart datasets, and as a result of these observations, 272 of them were eliminated and a new data set containing a total of 918 data was created. This study is important in terms of early identification of patients at risk of heart disease.

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AUTOMOTIVE INDUSTRY SPARE PARTS STOCK MANAGEMENT ABC ANALYSIS BASED AHP METHOD APPLICATION

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ABSTRACT

Inventory management plays a critical role in the success of companies. For this reason, stock control and planning of all assets in the production system should be done effectively. Spare part groups are more in number and variety, making stock management even more complicated. For the effective realization of stock management, companies aim to have the right material, in the right quantity, in the right place. The fact that the company has more stock than it needs causes it to bear the cost of overstocking, and the presence of excess stock also affects the useful life of the material. On the contrary, the fact that the enterprises do not have enough stocks causes the company to lose sales and the production line to stop, and thus the company experiences prestige and financial losses. For this reason, in this study, in order to determine the frequency and criticality of materials or parts, in the production of spare parts in the automotive industry, the Analytical Hierarchy Process (AHP) method after ABC analysis was used to determine the consumption rate of the materials, the rate of use, and the importance level according to the cost classification of the material. AHP is a method that can evaluate qualitative and quantitative criteria in decision making and solve complex problems in a hierarchical structure. ABC analysis includes the classification of the materials that make up the stocks according to their importance. By considering the inventory costs and determining the importance and group A classification; with the criteria of preparation times, cost, daily consumption amounts and safety stock amounts, priority spare parts were determined by the AHP method and the effects of these two methods on the stock cost were examined.

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Key words and phrases. Inventory management, ABC analysis, Multi-criteria decision making, AHP method, Spare parts

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EVALUATION OF THE EFFECTS OF VISUAL AND SOMATOSENSORY INPUTS ON BALANCE IN THE ELDERLY BY USING MACHINE LEARNING

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ABSTRACT

Decrease or deterioration in both visual and somatosensory inputs in elderly people leads to balance problems that increases the risk of falling. Instability or irregularity of the Center of Pressure (CoP) may be associated with an increased risk of falls. The irregularity in CoP time series can be measured by nonlinear methods rather than linear or statistical approaches. In recent years, Entropy measurements have been used as a very popular method for measuring irregularity and complexity in time series. This study aimed to examine the effect of visual or somatosensory inputs on CoP signal that may be associated with falls in the elderly using machine learning models with entropy-based feature set. A public CoP data of elderly recorded in eyes open-closed on rigid and compliant surface were used. The feature set was extracted by calculated Sample Entropy, Fuzzy Entropy, Distribution Entropy, Conditional Entropy, Permutation Entropy, and Sparse Density Entropy from CoP data. Then, CoP variables were classified by using Support Vector Machines (SVM) and K-Nearest Neighbors (k-NN) algorithms from Machine Learning (ML) models in visual and somatosensory provocation. Classification performances were compared with the confusion matrix (with accuracy, sensitivity, selectivity and precision metrics). When surface conditions were compared, the SVM algorithm showed the best performance with respect to k-NN in both training and testing with 82% and 79% accuracy, respectively. On the other hand, when visual inputs were compared, SVM revealed the best results in training and testing with an accuracy rate of 61% and 63%, respectively. This study indicated that the measurement of CoP irregularity or nonlinear dynamics in balance assessments in the elderly was more sensitive to somatosensory inputs than visual inputs. Consequently, in the elderly, especially in rigid-compliant surface experiments, entropy measurements of CoP signal could be an indicator or biomarker of the falling risk.

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THE INFLUENCE OF THE LACTATION PERIOD AND THE TYPE OF MODIFIED MILK ON THE CONTENT OF ESSENTIAL AMINO ACIDS IN HUMAN MILK AND INFANT FORMULA

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ABSTRACT

It is reported that human milk is a source of nearly 300 proteins with unique functional properties. They are a source of amino acids that have properties that ensure the rapid growth of an infant [1]. The content of total protein in human milk is physiologically determined and is at a similar level in each of the lactating women. However, throughout the lactation period, the content of amino acids in human milk changes, which, together with the growing child's body, perform specific functions [2]. The amino acid composition of modified milk should be composed in such a way that the content of essential amino acids is at least equal to their content in human milk [3]. The aim of the study was to evaluate the content of essential amino acids in human milk in relation to the lactation period and in infant formula intended for infants' first and follow-up feedings.

The research material consisted of samples of breast milk and modified milk from three manufacturers. Breast milk samples were collected from 100 local women currently living in the east-northeast region of Poland. Due to the insufficient number of samples for analysis, analytical tests were carried out on 75 samples of human milk (38 from the first lactation period and 38 from the second lactation period). Additionally, three producers of modified milk meant for infants' first and follow-up feedings were included in the research materials. The analysis of the amino acid content was carried out using the gradient high-performance liquid chromatography technique (HPLC) described by Rynkiewicz et al. [4] with some modifications.

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In the analyzed samples of human milk and infant formula, individual essential amino acids were identified: histidine, isoleucine, leucine, tryptophan, phenylalanine, threonine, lysine, valine, and methionine. Breast milk from the second lactation period contained significantly higher amounts of methionine (Mann-Whitney test: $t=-3.947$, $p=0.00008$), leucine (Mann-Whitney test: $t=-2.203$, $p=0.028$), isoleucine (Mann-Whitney test: $t=-2.203$, $p=0.028$); $t=-3.550$, $p=0.0004$) and threonine (Student's t-test: $t=-2.164$, $df=154$; $p=0.032$). The content of histidine, threonine, lysine, and methionine was at a higher level in modified milk compared to human milk ($p\leq 0.05$). In the case of modified milk, the content of amino acids varied depending on the producer and the type of milk (first or follow-up infant formula). The tendency to change the composition of milk in relation to the lactation period is physiologically determined, and the protein content decreases in favor of the fat content, which makes breast milk more energetic as the child grows. The amino acid composition of human milk is regulated throughout the lactation period to perform specific functions in the developing body of the newborn. Producers of modified milk are obliged to compose an appropriate amino acid profile that fully covers the needs of infants for each of the exogenous amino acids [1].

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EFFECT OF PRODUCTION METHOD ON SELECTED BIOACTIVE COMPOUNDS AND ANTIOXIDANT ACTIVITY OF JAPANESE QUINCE AND QUINCE FRUIT TINCTURES

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ABSTRACT

In Poland, a tincture is a well-known alcoholic beverage defined as a drink consisting of ethanol, herbs, fruits, plants roots and sugar. The traditional method of tinctures production involves macerating fruit in an aqueous ethanol solution for an average of 2 months, depending on the fruit species [Śliwińska et al. 2016; Polak, Bartoszek 2015]. Nowadays, new solutions are being sought to help producers shorten the time of the tincture-making process. One of those solutions could be the use of the *sous vide* technique as an alternative fruit maceration method.

The aim of the study was to evaluate the effect of the maceration method on the content of vitamin C, phenolic compounds and antioxidant activity of tinctures manufactured from Japanese quince and quince fruits. Japanese quince and quince fruit and ethyl alcohol (96%) were purchased at a retail store in Olsztyn. Fruits used for tinctures production were subjected to the traditional maceration, as well as *sous vide* heating at 40 and 60°C using different of ingredients (alcohol or sugar) addition. The tinctures produced were analyzed after 6 months of maturation. The tinctures were evaluated for vitamin C concentration by the HPLC method, total phenolic compounds using Folin-Ciocalteu reagent and antioxidant activity by the DPPH radical method [Singleton and Rossi 1965, Brand-Williams et al. 1995, Gökmen et al. 2000]. The results were subjected to statistical analysis (analysis of variance, Tukey's test, $p < 0.05$).

Based on the results of the study it was observed, that both fruit tinctures produced by the traditional method had a significantly higher concentration of vitamin C compared to those produced by the *sous vide* method. Maceration of fruit by the *sous vide* heating at 40°C method resulted in higher retention of vitamin C in tinctures compared to the *sous vide* 60°C method. Tincture manufactured from Japanese quince fruit by the *sous vide* 60°C method, in which sugar was added to the fruit before ethanol, showed the lowest vitamin C content among that fruit tinctures analyzed. The process of macerating Japanese quince and quince fruit using the *sous vide* method at 40°C and at 60°C with ethanol, resulted in a significant increase in the concentration of total phenolic compounds in the tinctures compared to the traditional method.

At the same time, tinctures prepared from Japanese quince and quince fruits macerated using *sous vide* at 60°C in ethanol showed a higher concentration of total phenolic compounds compared to tinctures produced by the *sous vide* method at 40°C. The highest and comparable antioxidant activity in the group of Japanese quince tinctures, was noted for traditionally and *sous vide* at 60°C in ethanol macerated beverages, while in the group of quince tinctures the highest antioxidant properties were observed for the tincture manufactured by the *sous vide* method at 40°C. Both fruit tinctures produced by macerating fruit in sugar (*sous vide* 60°C) showed the lowest antioxidant activity in their respective groups of tinctures.

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The temperature of maceration and maceration medium (ethanol or sugar) showed a significant effect on the content of the bioactive compounds studied and the antioxidant activity of the tinctures. It seems, that fruits maceration with the use of the *sous vide* method is a good alternative to macerating fruits by the traditional method due to the shorter time of the tincture-making process. In addition, the increase in maceration temperature resulted in a higher concentration of phenolic compounds and a favorable antioxidant activity of fruit tinctures. The 60°C *sous vide* method seems to be superior to the 40°C *sous vide* method due to the higher concentration of phenolic compounds and better antioxidant activity. The method of maceration of fruits in sugar at 60°C appeared to be the weakest in terms of the parameters tested. The possibility of using different temperatures and the raw materials addition at the maceration stage are apparently important for developing new methods of tincture production that will be beneficial in terms of bioactive components and antioxidant activity.

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DETERMINATION OF PRIORITY AREAS FOR A POSSIBLE UNDERGROUND DAM AROUND THE HARŞİT STREAM BASIN

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ABSTRACT

There is a need for efficient use of water resources worldwide due to factors such as drought, climate change, increasing world population, and high urbanization rate. Therefore, it is necessary to use renewable energy sources for sustainable water resources. With the exposure of aboveground dams to the effects of evaporation losses, the need for underground dams has increased. Underground dams increase the reserve volume by storing water with minimum leakage and allow future generations to benefit. Unlike other types of dams, it is an interesting subject of study due to its long life and low cost. The 9 parameters used in this study (drainage density, land use, land slope, precipitation parameter, permeability, flow length, main tributary density, population density, distance to the fault line) were taken into consideration and it was determined that Gümüşhane is the arid and largest basin in the Eastern Black Sea Region. Since there is a need for water use in the Harşit basin, which covers the province of Bursa, it is aimed to determine a suitable location for the underground dam with the help of GIS (geographic information system) in these sections. In determining the position, the most negative value of "0" and the most positive value of "100" were assigned, and thus all parameters were provided to take values on a common scale (0-100). As a result of this study, it was concluded that the areas with high values as the most suitable places for underground dams, and the areas with values (54.0392157-62) in the Harşit basin in Gümüşhane province of the study area can be positioned for the underground dam. (1- Gümüşhane center Bağlar Başı Mahallesi, 2- Gümüşhane center Pirahmet village junction, 3- Gümüşhane center Yağmur Dere village junction).

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NONLINEAR DIFFERENTIAL EQUATIONS ACCORDING TO THE BISHOP PARALLEL TRANSPORT FRAME

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ABSTRACT

Bishop created a curve-specific alternative to Frenet's frame and named it Bishop frame. It is known that for a given constant vector field concerning Bishop parallel transport frame $\{T, M_1, M_2, M_3\}$, there are no $(1, k)$ -type slant helices for $1 \leq k \leq 4$ in [23]. The aim of this paper nonlinear differential equations according to Bishop parallel transport frame $\{T, M_1, M_2, M_3\}$, for (k, m) -type slant helices (2,3)-, (2,4)-, and (3,4)-type slant helices in 4-dimensional Euclidean space. It then provides characterizations of (k, m) -type slant helices in accordance with the Bishop parallel transport frame in 4-dimensional Euclidean space.

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NUMERICAL SOLUTIONS OF CONFORMABLE TIME-FRACTIONAL KLEIN-GORDON EQUATION WITH PROPORTIONAL DELAY BY THE NOVEL METHOD

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ABSTRACT

The conformable fractional q -Shehu homotopy analysis transform method are utilized to examine the conformable time-fractional Klein-Gordon equations with proportional delay. The graphs of the numerical solutions to this problem are plotted in Maple software. Numerical simulations show that the suggested method is successful and consistent.

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FAULTS AND SUGGESTIONS DETECTED IN DISTRIBUTION PANEL AND TRANSFORMERS IN POWER PLANTS

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ABSTRACT

The demand for the widespread use of solar power plants in Turkey with full efficiency is increasing day by day. Panel failures, transformer failures, such as panel failures, are among the failures that affect the efficiency. Maintenance and thermal imaging are often required if full efficiency in power generation from a solar power plant is desired. Thermal imaging methods are both fast and highly accurate in detecting faults. In this study, faults in distribution panels and transformers were detected in a power plant with thermal imaging technique and solution suggestions were presented.

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EVALUATION OF ENVIRONMENTAL, SOCIAL AND ECONOMIC PERFORMANCES OF 81 PROVINCES OF TURKEY WITH DATA ENVELOPMENT ANALYSIS

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ABSTRACT

In this paper, we aimed to examine the 81 provinces of Turkey in terms of environmental, social and economic aspects and to shed light on current problems. As a result of the industrial revolutions, the rate of urbanization and the urban population has increased rapidly throughout the world. As a result of intense migration from rural to urban areas, the need for shelter and housing has emerged. Every new building built, every new road opened for transportation has affected the nature and ecology of the city. However, as the rate of urbanization increased, cities showed improvements in areas such as health, education and finance. This situation has led people living in the countryside, who are deprived of health and education services, towards city life. Urbanization has taken place very quickly in Turkey, and imbalances have occurred in the country's urban population and urbanization rates. Especially Istanbul has grown very fast compared to other developed cities. As Turkey's most populous city, approximately one-fifth of the country's population lives in Istanbul. The uneven distribution of population and employment and rapid urbanization cause various problems in social, environmental and economic dimensions. Environmental, social and economic indicators selected for analysis were evaluated with data envelopment analysis. Data Environmental Analysis Program (DEAP) 2.1 package program was used to analyze the activities of 81 provinces in line with the determined indicators. As a result of the study, the environmental, social and economic efficiency of 81 provinces was evaluated in line with the indicators. Based on the results, suggestions and discussion areas that can guide other studies have been put forward.

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MICROWAVE ENERGY-BASED HYBRID NANOMATERIAL PREPARATION APPROACH FOR ENERGY STORAGE PURPOSES

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ABSTRACT

A promising electrochemical energy storage material is prepared based on carbonized conducting polymer (cCP) such as polypyrrole (PPy) nanoparticles (NPs) with concurrently grown carbon nanotubes (CNTs) and metal oxide nanowires (MONWs) on its surface. Both the preparation of this novel hybrid nanomaterial (HNM), and the tackling of commonly encountered conventional synthesis difficulties were accomplished systematically by combining an in-situ polymerization/coating method with a modified version of the PopTube, ex-situ microwave (MW) energy-based technique, which has proven to be well-established, facile, and rapid. By using this highly efficient and easily scalable combined preparation approach, targeted HNMs can be produced in a cost-effective manner, with distinct features of morphology (SEM/TEM), elemental (EDX), spectroscopic (XRD, Raman) and electrochemistry (CV), all of which are substantially backed by material characterization tests and the literature evidence, as well. Consequently, it is expected that this combined approach can provide cPPy NPs decorated with CNTs and MONWs, with the potential to be a preferred material in near future for its aforementioned use.

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MULTI-OBJECTIVE OPTIMIZATIONS of CIRCULAR and SQUARE DUCTS UNDER LAMINAR FLOW and CONSTANT WALL TEMPERATURE CONDITIONS

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ABSTRACT

Optimum parameters of ducts having different cross-sections (circular and square) are explored using multi-objective optimization algorithms in this study. Heat transfer and fluid flow analysis of ducts are done with finite volume method. The flow is assumed as steady, incompressible and laminar. Three different multi-objective problems are investigated for each cross-section, i.e. (1) maximization of heat transfer (\dot{Q}) and minimization of pressure drop (ΔP), (2) maximization of heat transfer (\dot{Q}) and minimization of entropy generation (\dot{S}_{gen}), (3) minimizations of volume (V) and pumping power (\dot{W}_{pump}). Air is used as a working fluid, inlet and wall temperatures are given and constant. Each optimization problem constrained with a maximum duct length. Three optimization variables are used which are hydraulic diameter (D_h), duct length (L) and inlet velocity (V_{in}). Optimum parameters of different multi-objective optimization problems are obtained and comparisons are done in detail. The effect of optimization variables on the objective functions are also discussed. It can be inferred that optimum parameters of ducts (circular and square) can be determined according to the design objectives. Moreover, optimum parameters differ from each other.

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COMPARISON OF REACTIVITY FEEDBACK COEFFICIENTS OBTAINED FROM MCNP6.2 AND SERPENT MONTE CARLO CODES

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ABSTRACT

Fuel (Doppler) and moderator reactivity coefficients that are important for nuclear reactor reliability are calculated using different ready Monte Carlo codes and different cross section libraries. In the unit-cell reference study of the Pressure Water Reactor, the Doppler reactivity coefficient was calculated using the code MCNP 6.2. In this study, Doppler reactivity feedback coefficient was obtained using the SERPENT-2 Monte Carlo Simulation code and ENDF-VII and JEFF-3.1.1 libraries, taking into account fuels with different enrichments. It was observed that the results obtained were in line with the reference study results. In addition - in the case of HFP operation, the moderator temperatures were obtained by taking 560K and 600K respectively, with the decelerator reactivity coefficient ENDF/B-VII and JEFF-3.1.1 libraries as -29.56 and -30.03 [pcm/k] respectively.

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THE EFFECTS OF CYLINDRICAL AND PARTIAL PIN FINS ON THE COOLING PERFORMANCE OF A MINICHANNEL HEAT SINK

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ABSTRACT

In this paper, the effects of cylindrical and partial pin fins within the flow domain on the cooling performance of a liquid-cooled minichannel heat sink are investigated numerically. For this purpose, studies are carried out for four different pin fin configurations between the flow rates of 0.002625 kg/s and 0.0045 kg/s. These configurations include in-line and staggered arrays of cylindrical and partial pin fins. Numerical studies are carried out via ANSYS Fluent software. As a result of the numerical analysis, it is predicted that the discussed configurations will significantly improve the convective heat transfer from the minichannel heat sink.

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(α, β) -INTERVAL VALUED INTUITIONISTIC FUZZY SUBGROUPS

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ABSTRACT

In this study, the definition of (α, β) -interval valued intuitionistic fuzzy subgroup is given. The concept of (α, β) -interval valued intuitionistic fuzzy subgroup is constructed on (α, β) -interval valued intuitionistic fuzzy sets which were defined by Bal, Çuvalcıoğlu and Altıncı in 2023. (α, β) -interval valued intuitionistic fuzzy sets were defined on (α, β) -interval valued set whose elements are pair of closed intervals that the sum of their supremums is equal to 1 or less than 1.

The fundamental properties of these subgroups are examined. The basic propositions and theorems of these groups are given. The relations between (α, β) -interval valued intuitionistic fuzzy subgroup and the level subset of (α, β) -interval valued intuitionistic fuzzy sets are researched. Then it is seen that the level subset of (α, β) -interval valued intuitionistic fuzzy sets of G group is a classical group. An example of these groups is given.

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CLASSIFICATION OF BRAIN TUMORS ON MRI IMAGES USING DEEP LEARNING ARCHITECTURES

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ABSTRACT

A brain tumor is a dangerous neural illness produced by the strict growing of prison cell in the brain or head. The number of patients suffering from brain tumor remains increasingly cumulative. Initial detection of wicked cancers is vital to provide cure to sickness, and early identification reduces the risk of death. If a brain cancer is not predicted in initial phase, it can assuredly cause to death. Hence, primary identification of brain tumors requires the usage of a mechanical means. The segmentation, analysis, and separation of unclean tumor parts from MRI images are the main source of anxiety. Nevertheless, the situation is a boring and slow procedure that radiologists or scientific professionals need to assume, and their act is only reliant on their knowledge. To report the segmented MRI images including tumor, the usage of computer-assisted methods come to be necessary. In this paper, a Convolutional Neural Network (CNN) approach is used to identify brain cancers in MRI images. Two datasets are used for this study, namely Kaggle Brain MRI dataset and Figshare Brain MRI dataset. Models of deep CNN, consisting of VGG16, AlexNet, and ResNet, are utilized to extract deep features. The classification accuracies of the aforementioned deep learning models are used to measure the efficiencies of the implemented systems. For the Kaggle dataset, AlexNet achieves a 98% accuracy, VGG16 has 97% accuracy, and ResNet has 66% accuracy. Among these networks, AlexNet has provided the highest level of accuracy. In the Figshare dataset, AlexNet and VGG16 both achieve 99% accuracy, and ResNet has 96% accuracy. In terms of accuracy, AlexNet and VGG16 outperform ResNet. These performances aid in the early detection of cancers before they cause physical harm such as

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ACTIVE PACKAGING FILMS INCORPORATED WITH ESSENTIAL OILS IN NANOEMULSION FORMULATION

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ABSTRACT

Biodegradable films and coatings are an effective alternative to conventional plastics. The purpose of their use is to extend the shelf life of perishable food and maintain or improve the quality and safety of prepared food. Their performance also depends on the type of additive used. An example of such an additive can be essential oils, which are a good material for active packaging due to their safety and antibacterial and antioxidant properties. The aim of the research was to fabricate Sage Leaf essential oil (SLEO) nanoemulsions added to the polymeric film and determine the main physicochemical properties of the films and the effect of the addition of this oil on the biological properties of active films. The control films were made from a hybrid solution of Poly vinyl alcohol (PVA) and Chitosan. On the other hand, the nanoemulsions of SLEO at different concentrations were prepared using ultrasonication. Films with the addition of SLEO were made analogously, adding the nanoemulsion of SLEO in the last step. The solvent casting method was used to prepare control films and SLEO-added films. For the characterization analyses, the droplet size of emulsions was determined using Zeta-Sizer, and the stability of nanoemulsions was also studied. Active films were evaluated with microscopy images, Fourier transform infrared spectroscopy, contact angle measurements, water vapor permeability, and determination of solubility in water. It is aimed to produce environmentally friendly, edible and sustainable packaging materials by combining biocompatible and biodegradable polymeric films with antibacterial essential oils. At the same time, it is aimed to minimize microbial spoilage and extend shelf life by increasing antibacterial and antioxidant properties with the added essential oil.

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Key words and phrases. Sage leaf essential oil, nanoemulsion, polymer, film, active packaging

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SMART FILM PRODUCTION BY INCLUDING BIAOCTIVE COMPOUNDS

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ABSTRACT

Packaging is an integral part of many food products and has a significant impact on their commercial appeal. In connection with the growing awareness of consumers, packaging, in addition to its protective, informational or commercial function, increasingly exhibits other functional properties. One of the new generations of packaging is smart packaging, which, through an indicator placed inside, provides consumers with information about the current quality of the product. It allows to get information about food quality and safety without opening the package. The aim of the study was to develop novel active edible coating with addition of black carrot extract as a pH indicator and to study the physicochemical properties of the produced coatings. For this aim, film forming solutions for control films were made with pectin and locus bean gum polymers. Then, different amounts of black carrot extract were directly added to the polymer solutions and final coatings were prepared by solvent-casting. The prepared films were characterized in terms of selected properties: chemical structure, morphology, mechanical behaviour and sensing properties. In the light of the results obtained from the study, it is aimed to produce antibacterial, biodegradable and environmentally friendly packaging materials with the combination of natural ingredients. The use of such packaging solutions is a convenience for consumers, who can monitor the safety and quality of food products themselves. Moreover, better control over the freshness status of food products can make it easier to manage food with a short shelf life, which will significantly reduce food waste worldwide.

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Key words and phrases. biopolymers, bioactive compounds, solvent casting, smart films

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**PISTACHIO SPECIES IDENTIFICATION USING HISTOGRAM OF ORIENTED
GRADIENT DESCRIPTORS AND SUPPORT VECTOR MACHINE**

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ABSTRACT

Developing intelligent systems, including computer vision and machine learning technologies for classifying agricultural products according to their types, are an interesting research topic. Here, models are obtained with the help of intelligent systems to decide. These models simulate human visual perception for the classification of agricultural products. In this study, an approach combining the histogram of oriented gradients (HOG) technique and support vector machine (SVM) was proposed for pistachio image species classification. In this study, image features were extracted using different cell sizes of the HOG. These features were classified using different kernel functions of SVM with 10-fold cross-validation. Thus, this study investigated the possibility of improving an existing method by making it learnable. In the experimental results, the proposed approach achieved different success with a different number of features. This study showed that the best performance results were obtained in the model where the cell size was 128 x 128 and the kernel type was polynomial. The accuracy of this model was 0.940, sensitivity 0.938, specificity 0.941, F-score 0.930, G-mean 0.931, and AUC value 0.978.

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Key words and phrases. Histogram of oriented gradient, support vector machine, Pistachio species, detection

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ON FUZZY BOOLEAN ALGEBRA WITH RESPECT TO NEW FUZZY LOGIC CONJUNCTION

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ABSTRACT

Fuzzy logic rules are given by means of triangular norms (t-norm) defined on the unit interval. A triangular conorm (t-conorm) is obtained for each triangular norm. For the negation of expressions, functions defined on the unit interval are used. The structure established through these functions contributes to the formation of fuzzy set theory and fuzzy mathematical structures as in the classical theory. Mathematical structures are used in many fields of engineering. In this study, the definition of the concept of xnorm is given. The properties of xnorms are examined. Fuzzy Boolean Algebra (FBA) structure definition is given by using t-norm, t-conorm, known negation and corresponding xnorm. Also, basic properties provided by FBAs were given.

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DESIGN OF LOAD LIFTING EYEBOLTS AND STANDARDIZATION WITH STATIC TESTS

YASİN AYGÜL and FURKAN DEMİRTAŞ

ABSTRACT

Load lifting eyebolts added by welding method are used for lifting and transporting raw materials, semi-finished products or finished products. Making the right choice according to the load capacity is important in terms of preventing negative consequences. In this study to verify the choice of loading capacity; Preliminary designs of different types of eyebolts were created. Preliminary designs were subjected to Finite Element Analysis by determining the boundary conditions in the computer environment. Eye bolts designed in five types are fixed with the surface formed by the thickness of the weld seam. The load is applied according to the eyebolt types, which are pre-designed in a way to preserve the yield stress with a three-fold safety. According to the results of the analysis, improvements were made in the preliminary designs and they were finalized. All types of samples are produced for the final products and Koluman Otomotiv Endüstri A.Ş. Tensile test was applied in the quality laboratories of the company. As a result of this study; The static use of the products was investigated by comparing the Finite Element Analysis results with the Tensile test results. According to the results of the research, it is planned to use the products in standard form.

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CONTRA CONTINUITY FOR λ -STRONG β -I-CLOSED SETS

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ABSTRACT

In this paper we investigate the notion of λ -strong β -I-open sets which are complement of λ -strong β -I-closed sets. Then, defining types of contra continuity for λ -strong β -I-closed sets we will give properties and characterizations of them. We investigate the relationships among the other functions with it.

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INVESTIGATION OF THE EFFECT OF TYPES AND PARTICLE SIZES OF REINFORCEMENTS ON COMPOSITE HARDNESS OF AL6061

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ABSTRACT

Since the prices of ferrous and non-ferrous raw materials in the industry are increasing day by day and the parts in the machines have more complex geometric structures, it is necessary to use new production methods according to the geometric structure of the part to be produced, the desired strength and hardness value [1-3]. By using powder metallurgy production method, which is one of the innovative production methods, material efficiency, complex geometric shaping, fewer process steps as well as composite material production, strength and hardness of the produced material can be increased [4-5]. In this study, as a result of literature research, different types of reinforcements were added by weight to aluminium matrix composites at the same production parameters for each composite material produced. The reinforcement groups used consist of titanium carbide (TIC) and Graphene Nano Platelets (GNP). In this study, mono and hybrid composites with Al6061 matrix structure were successfully fabricated. The composites produced are Al6061/TIC, Al6061/GNP, Al6061/TIC/GNP. Hardness tests were performed according to Vickers hardness standards to determine the change in hardness of the composite materials produced according to the reinforcement type. As a result of the hardness tests, the changes in the hardness value of the composite materials produced by powder metallurgy method compared to the unreinforced Al6061 material were investigated and a significant increase in hardness was obtained with reinforcement.

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Key words and phrases. powder metallurgy, metal matrix composite, hardness

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NUMERICAL SIMULATION OF GRAPHENE/N-WS₂/A-SI:H(I)/P-C-SI/AG HIT SOLAR CELLS

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ABSTRACT

The discovery of new materials has led to advances in optoelectronic technology and has become a major source of motivation for many researchers. This has enabled higher efficiency values to be achieved in solar cells, which have a very important place in optoelectronic technology [1, 2]. Heterojunction with intrinsic thin layer (HIT) solar cells are one of the highest cell efficiency among silicon-based solar cells. HIT solar cells can be produced in different configurations [3, 4]. In this study, graphene/n-WS₂/a-Si:H(i)/p-cSi/Ag HIT solar cell was designed and some important photovoltaic properties were analyzed by using AFORS-HET software (version 2.5). Tungsten disulfide (WS₂) is an important member of the transition metal dialcogenides (TMDCs) class, which includes hexagonal structured, layered materials with molecular formula of XY₂, where X is transition metals such as Nb, W, and Mo, and Y is chalcogens such as Te, Se, and S [5, 6]. Recently, ultrathin WS₂ has become one of the interesting materials in the investigation of solar cell structures due to its superior electrical and optical features [7]. The most important aim of this study is to find a suitable way to enhance the performance of n-type WS₂/p-cSi heterojunction solar cells through simulation. The parameters of both the Si and WS₂ layers were optimized, and a photovoltaic conversion efficiency value of 23.47% was obtained in the simulations. As a result, it has been shown that the WS₂ material and the designed structure can be used in solar cell applications.

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Key words and phrases. AFORS-HET, HIT solar cells, WS₂, power conversion efficiency

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THEORETICAL INVESTIGATION OF ALTERNATIVE FUELS WHICH CAN BE USED ON SHIPS

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ABSTRACT

In this study, it is concentrated on biodiesel, which stands out with many other features such as not requiring engine/machine modifications, being cleanly synthesizable, and it allowing a wide range of flexible modifications and fuel mixtures thanks to its low carbon and near-sulfur content. The study also includes theoretical comparisons of alternative fuels with machine performance and emission aspects.

Comparisons with the diesel engine show that biodiesel has poor atomization as a side effect of high viscosity, which reduces the combustion efficiency of the machine at high torques and can increase exhaust gas temperatures. LNG and hydrogen, which have low viscosity in this regard, can show better results with the same mass injection amounts and suitable mixtures in suitable engines. In addition that, the self-ignition temperature of biodiesel is higher than diesel; unlike other alternative fuels, its use in a diesel engine does not require modification as it can give the lowest ignition delay desired for a diesel engine compared to other alternative fuels due to the low cetane number. Biodiesel does not require modification for the fuel-air mixture ratio or requires less than other fuels. Biodiesel provides lower efficiency and power output as it has lower thermal values than conventional diesel. Hydrogen and LNG will be preferable choices on these issues. All alternative fuels, except prolytic, are sulfur free or very low sulfur content. Therefore, it does not require hydrodesulphurization, which reduces biodiesel lubrication, and maintains its good lubrication and extends the life of the materials. It has been observed that the biodiesel has a higher flash point compared to the fuels compared and it is understood that it is the most reliable fuel for storage-transport-transfer. Methanol and ethanol, which accumulate less electric charge than other fuels, were found to be more reliable due to their lower electrical resistance. It increases NO_x emissions in general with results that may vary depending on the biodiesel raw material, engine and loads. While CO_2 emission does not change on average, it decreases SO_x emissions like all other alternative fuels. The only fuel that produces emissions below all emission limits in Marpol regulations is found as LNG

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APPROXIMATE SOLUTIONS OF SOME FREDHOLM INTEGRAL EQUATIONS ASSOCIATED WITH LUCAS POLYNOMIALS

Ç. TÜRKOĞLU AND M. GÖCEN

ABSTRACT

In this study, we seek the approximate solutions of some second kind Fredholm integral equations by using Lucas polynomials with hat basis functions. We also present certain numerical examples to support our theoretical results.

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A PERFORMANCE ANALYSIS OF ATTACK INDIVIDUAL PENSION FUNDS BY A SYSTEM DYNAMICS SIMULATION APPROACH

MUHAMMED ORDU

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ABSTRACT

The individual pension system has been developed to overcome the shortcomings of the existing social security systems and is still used in many countries. This system, which aims to increase the living standards of individuals during their retirement and to earn additional income in addition to their retirement income, includes incentives to ensure that the participant stays in the system for a long time. In this context, participants who make long-term investments benefit from many advantages such as tax withholding, high state contribution rate and entrance fee exemption. At the same time, 30% of each contribution paid regularly by the participant is invested in the participant's account as state contribution. Companies operating in the individual pension system develop pension plans for participants in different risk groups. In this study, a simulation model was established by using system dynamics approach, taking into account the components of the Turkish individual pension system. By this simulation model, the performances of pension mutual funds (i.e., first public external debt instruments fund, second public external debt instruments fund and developed countries variable fund) in the attack risk group of an individual pension company operating in Turkey were analyzed under different scenarios. In the study, the data of the relevant company between 2015 and 2020 were used. The performances of three different attack pension mutual funds were analyzed under scenarios consisting of five different investment periods, in which the advantages and deductions of the individual pension system were taken into account. As a result, no fund is profitable in the short term, and an investment with an investment period of at least 36 months is the right option. It is predicted that the first public external debt instruments and developed countries variable funds are more profitable than the second public external debt instruments fund in the 72- and 120-month investment period. In the last scenario, in which a participant invests in the system by meeting all the conditions, it has been determined that the pension mutual fund, which consists of the first public external debt instruments fund, is more preferable. This simulation model developed in the study can be used effectively by all stakeholders of the individual pension system, and the participants will be able to choose more appropriate funds by comparing pension mutual funds.

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STRUCTURAL ANALYSIS DEVELOPMENT STUDY OF THE REAR COVER USED IN THE TRAILER VEHICLE

ONUR CAN KIRIT, MEHMET VURGUN

Abstract

The durability and sustainability of semi-trailer vehicles, which are among the locomotive products of today's transportation system, are important for the user. Trailers with high quality and solid construction both provide prestige for the manufacturer and enable the users to use the vehicle with confidence.

With the opening of the rear door on the trailer, forklift entry into the trailer is provided. Durable and safe structure design is important to minimize the chassis damage that may occur at the forklift entrance[1]. In this study, the structural analyzes of various rear cover geometries were examined and these designs were compared within each other. Model design was carried out with Catia V5 program and analysis studies were carried out in Ansys Workbench.

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REDUCING THE USE OF HIGH-STRENGTH SHEET METAL IN TIMBER CARRIER SEMI-TRAILER VEHICLES

MEHMET VURGUN, ONUR CAN KIRIT

ABSTRACT

The timber carrier vehicles in the Semi-Trailer product group are vehicles that are produced without curtains and have replaceable support parts in their superstructure. The product is especially used for the transportation of cylindrical and irregular loads. As the usage areas are off-road conditions, axle manufacturers do not approve the use of standard axle combinations. The axle combinations used are presented in reinforced axle status. Apart from the load factor of the vehicle, there are risk factors arising from the conditions of use. The first of these is the irregularity of vehicle loading conditions. Irregularities are loadings by dropping loads from high points (3000-4000 mm) and dynamic force changes due to this[1].

The work done; It is a set of analyzes and controls that will ensure the use of standard sheets that are easy to supply from the market, instead of high-strength sheets, by ensuring a minimum increase in the chassis weight by paying attention to the conditions of use. Model design was carried out with Catia V5 program and analysis studies were carried out in Ansys Workbench.

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IMPACT SLIDING WEAR BEHAVIOUR OF THERMALLY OXIDIZED Ti-6Al-4V ALLOY

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ABSTRACT

Titanium alloys are promising lightweight materials that have the potential to replace the current use of stainless steels in applications involving engine valves; however, their wear resistance needs to be improved. In this study, Ti-6Al-4V was thermally oxidized (TO) at 600 °C for 60 h to create a surface rutile, TiO₂, layer with a hardened oxygen diffusion zone. Using a dedicated laboratory-scale impact-sliding wear test, the wear behavior of untreated Ti-6Al-4V and TO-Ti-6Al-4V was examined against SAE 52100-grade bearing steel balls. The thermal oxidation caused a decrease in the wear rate at the impact and sliding zones of the wear track.

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SIMILARITY MEASURE IN BIPOLAR FUZZY SETS AND ITS APPLICATION TO MULTI-ATTRIBUTE DECISION MAKING METHOD

G. SEVER AND Z. ZARARSIZ

ABSTRACT

One important element in resolving difficulties in practical situations is the idea of bipolarity. A bipolar fuzzy set (BFS) is a powerful mathematical tool for dealing with unpredictability and uncertainty in real-world issues. In this study, we present new similarity metrics (SMs) based on specific BFS (bipolar fuzzy sets) characteristics. Additionally, appropriate numerical examples are used to explain the proposed SMs. A novel multi-attribute decision-making algorithm (MADM) and accompanying flow diagram are being developed. Furthermore, a comparison of the suggested method with some of the current similarity measures is made in order to establish the validity of the proposed MADM method. Beyond the implementation perspective, the proposed proposal has a lot of potential. Extensions of fuzzy sets could be modified slightly to implement the proposed metric in an efficient manner.

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PREDICTION OF COVID-19 CASES USING UNIDIRECTIONAL LSTM, BIDIRECTIONAL LSTM, AND DEEP NEURAL NETWORK APPLICATIONS

BAHA ŞEN and BÜŞRA DEMİRBAŞ

ABSTRACT

The COVID-19 pandemic has caused a worldwide health problem that has presented a lot of difficulties to the global healthcare sector, governments, and societies since management and control of the pandemic depend heavily on accurate estimates of the disease's spread and severity. This thesis investigates the application of deep learning models, such as Uni-LSTM, Bi-LSTM and DNNs, for COVID-19 prediction. It gathers and examines actual data from various nations, such as figures for cases, hospitalizations, and fatalities. Deep learning models train and evaluate the data, comparing the results based on metrics like accuracy, precision, re-call, and support. The study's findings demonstrate that Bi-LSTM outperforms other models in accurately predicting the spread and severity of the disease. This study recommends using a deep learning-based approach to recognize Covid-19 and no-finding occurrences in chest X-ray images and CT scans. It sheds light on applying LSTM and DNN systems for COVID-19 prediction. It emphasizes the significance of data quality and quantity in achieving accurate and trustworthy predictions. The classification performance of the trained models was evaluated using the above metric.

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ULTRASONIC PILOT REACTOR DESIGN: TEMPERATURE, PRESSURE AND ROTARY CONTROL CAN BE USED IN THE PRODUCTION OF HYGROSCOPIC MATERIALS

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ABSTRACT

Materials such as zinc chloride, sodium chloride, sodium hydroxide, magnesium oxide and calcium oxide retain water by means of diffusion and absorption into their crystals due to their chemical structure. Such materials are called hygroscopic materials and are used for both liquids and solids substances [1]. Normally, there is about 0.2-4 percent water vapor by mass in the air depending on the air temperature and ambient conditions. When hygroscopic materials come into contact with air/ atmosphere, they absorb water vapor and become moist. This makes it very difficult to produce, store, and use hygroscopic materials. Although special closed systems should be used for the production of hygroscopic materials, it is necessary to remove the water entering the medium or absorbed by the substance from the environment and reaction chambers at high temperatures are required for calcination processes [1-4]. However, there should be a mechanical mixing system in order to prevent mold formation during uniform heating and drying. In order to prevent the removal of gases arising during the reaction of hygroscopic materials from the environment or the humidification of the product, it is necessary to remove water vapor from the system or to carry out a continuity with an inert gas. In the hygroscopic material production systems used in the market, problems such as agglomeration of powders, adhesion of powders to the walls and high energy requirements are observed. In addition, the bulky structure and limited production capacities of these systems are another problem. With this study, a device to be used in the production of a new hygroscopic material was designed. In our study, first of all, the devices used in the market were investigated and the data to be used in the comparison of the system we will design were obtained. While hygroscopic materials are processed with mechanical mixers in conventional systems, air mixing units are used in the new system. Ultrasonic vibration parts are assembled on the surfaces of mixing tubes, to prevent agglomeration in the materials. Instead of the cylindrical mixing unit, particles were sent with hot air inside the pipes to prevent material sticking to the walls. Design studies were carried out in a computer-aided design program. The efficiency of the system was measured numerically by making

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Key words and phrases. Hygroscopic materials, Reactor design, Hygroscopic material sizing.

data obtained, a new system that is %42 lighter and %50 smaller in size compared to the existing systems has been designed. Compared to comparison systems, it has at least %38 more product processing capacity, and energy use is reduced by %25.

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FIXED-POINT THEOREMS VIA FUZZY-INTERPOLATIVE KANNAN TYPE CONTRACTION

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ABSTRACT

In this article, fuzzy-interpolative Kannan-type contraction is defined and then a theorem is proved that provides the existence of a fixed point for this contraction in both fuzzy metric spaces and extended fuzzy metric spaces. With new concepts and new theorems, a generalization of the existing ones in the literature has been obtained.

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ANALYSIS OF HEATING AND COOLING DEGREE DAY VALUES FOR TRA2 REGION PROVINCES

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ABSTRACT

The information required for engineers and designers for energy calculations of buildings in Turkey can sometimes be limited. For this purpose, this study is performed to determine heating and cooling degree days for the provinces (Ağrı, Ardahan, Iğdır, Kars) of the TRA2 region in Turkey, using average temperature data obtained from the Turkish State Meteorological Service. Within the scope of the literature review, the base temperatures of 14, 16 and 18 °C for heating degree days and 20, 22 and 24 °C base temperatures for cooling degree days are determined. These analyzes are important for architectural designs planned to be made in the provinces of the region, especially on insulation calculations, heating, cooling and air conditioning. It is very important to benefit from these analyses at the point of improving expenditures such as the demand for energy on a global scale and therefore fuel expenses. The results of this study are presented through tables and graphs. At result, it is clearly observed that there is an increase in the heating degree days for all provinces with the increase in the base temperatures. At the same time, the cooling degree day values for all base temperatures in Kars and Ardahan provinces are zero, which means that no cooling is required. The order of the annual heating degree-day value for all base temperatures from highest to lowest is Ardahan, Kars, Ağrı, and Iğdır. Also, as the altitude of the provinces increases, the heating degree days increase while the cooling degree days decrease.

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Key words and phrases. Cooling degree day, Heating degree day, TRA2 region, Turkey

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THERMAL DIFFUSION-BASED BORIDING EFFECT ON HVOF-SPRAYED AISI 316L STAINLESS STEEL COATING

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ABSTRACT

Boriding is an effective method for increasing the surface hardness of materials and preventing wear. Boriding can result in a unique combination of bulk and surface characteristics. According to several research, the most influential factors for boron diffusion during the boriding process are defects and residual stresses in the crystal lattice. Because thermally sprayed coatings exhibit a significant degree of deformation due to particle impact, defects and stress are to be expected. The purpose of this study was to look into the effect of thermal diffusion-based boriding on the 316L coating applied by the HVOF technique. Hardness, wear resistance and coefficient of friction were improved by the boriding coating. Surface boriding has the ability to improve the coating's longevity.

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Key words and phrases. AISI 316L, HVOF, boriding, wear.

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A NEW APPROACH TO GADOVAN NUMBERS

E. ÖZKAN¹, E. ESER² AND M. UYSAL³

0000-0002-4188-7248, 0000-0001-5965-4162 and 0000-0002-2362-3097

ABSTRACT

In this study, we give a new approach to Gadovan numbers. We represent the Binet formula, the generating functions, the exponential generating function of the new Gadovan numbers. Also, we obtain Cassini identity, Catalan identity, Vajda identity, Honsberger identity and D’ocagne identity for the new Gadovan numbers.

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Key words and phrases. Gadovan numbers, Binet formula, Exponential Function, Generating functions, Cassini identity, Catalan identity.ved.

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THE COMPARISON OF HYDRODYNAMICS DESIGNS OF DIFFERENT GEOMETRIES IN RESTRICTED AND UNRESTRICTED FLUIDAL MEDIUMS WITH POTENTIAL

MÜNİR SÜNER, S. AYDIN SALCI and SÜLEYMAN YİĞİT

0000-0002-3714-7044

ABSTRACT

In this study, the flow around redcell, perforated redcell, rankine oval, perforated rankine oval have been found out analytically and numerical within resctricted and unrestricted fluidal medium and investigated in state of what is off-centered in rectricted fluidal medium and subsequently they have been compared. The distribution of velocity and pressure of around them are compared and illustrated with matlab. When the perforated rankine oval is compared to redcell, perforated redcell, rankine oval, the pressure effecting the wall, though it creates the highest stability in redcell among all and some other disadvantages, it is understood that it has many more advantages in terms of usage and volume exist.

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Date: July, 8, 2023.

Key words and phrases. Hydrodynamics design, perforated Rankine oval, Redcell, solid model with potential flow theory, uncommon vehicle, pressure design, submarine

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**OPTIMIZING CO₂ LASER CUTTING PARAMETERS OF POLYETHYLENE
POLYMERIC MATERIAL USING HYBRID ENTROPY-TOPSIS APPROACH**

OĞUZHAN DER, GÖKHAN BAŞAR and MUHAMMED ORDU

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ABSTRACT

Polyethylene (PE) stands out as an incredibly adaptable thermoplastic, commended for its high ductility and resilience against impact, making it an ideal material for various applications. In the present study, a CO₂ laser, known for its precision and effectiveness, is utilized for cutting PE, a technique of crucial importance to industries where precision is non-negotiable. Three parameters - surface roughness, kerf width, and material removal rate - have significant implications on the laser cutting process. Surface roughness, which impacts both the aesthetic appeal and functionality of the final product, and kerf width, which determines the accuracy of the cut, is of paramount importance. On the other hand, the material removal rate, an important efficiency indicator, holds crucial significance for industries where production speed is a key determinant of success. In an effort to explore and refine these parameters, our study involves the use of a CO₂ laser on 4 mm thick PE while controlling the power (at 80, 90, 100 W) and the cutting speed (at 5, 10, 15 mm/s). To determine the optimal parameters, we integrated the Entropy and TOPSIS methods, which helped in calculating the criteria weights as 29.80% for surface roughness, 4.64% for kerf width, and 65.56% for material removal rate and determining the optimal experimental condition. The optimal CO₂ laser cutting parameters were those where the minimal surface roughness and kerf width were achieved simultaneously with the maximal material removal rate. The results obtained specified the optimal conditions at 90 W power and 15 mm/s speed. This research significantly contributes to the PE cutting process, ensuring high quality while also serving as a valuable reference for future studies and advancements in this field.

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Key words and phrases. CO₂ Laser Cutting, Multi-Criteria Decision Making, Parameter Optimization, Polyethylene

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8 JULY 2023

REGISTRATION (Face to Face)

OPENNING CEREMONY (Face to Face/Online)

Prof. Dr. Orhan Aydın

Assoc. Prof. Dr. Gökhan Çuvalcıoğlu

KEYNOTE SPEAKER

The Role of Engineering and Applied Sciences in Developing Innovative Energy Solutions

Prof. Dr. İbrahim Dinçer (Face to Face/Online)

Chair: Gökhan Çuvalcıoğlu

COFFEE BREAK

1. SESSION

HALL-A (Face to Face)-Mathematics

Chair: **Şehmus Fındık**

Generalization of Almost Primary and Nilary Ideals in Noncommutative Rings

Alaa Abouhalaka

Connected, Compact, and Sober Objects in ConLim

Kübra Çevik, Ayhan Erciyes

Dna Codes From Reversible Group Codes By A Virus Optimisation Algorithm

Adrian Korban, **Serap Şahinkaya**, Deniz Üstün

Fractional ECFG(1,1) model with an application

Ümmügülsüm Erdiñç, Halis Bilgil

HALL-B (Face to Face)-Engineering

Chair: **Buğra Sarper**

A Hybrid Deep Reinforcement Learning Algorithm Application For Vehicle Routing Problem

Meltem Atmış, Tolunay Göçken

Optimization of Gurney flap over NACA 0018 by using Surrogate Modeling

Emre Güler, Mehmet Erdem, Şihmehmet Yıldız, Melike Nikbay

The Comparison of Hydrodynamics Designs of Different Geometries in Restricted and Unrestricted Fluidal Mediums with Potential Flow and CFD

Munir Suner, S. Aydın Salci, K. Suleyman Yigit

KEYNOTE SPEAKER	
<p>From Type-1, to Type-2 and Type-3 Fuzzy Systems: Theory and Applications</p> <p>Prof. Dr. Oscar Castillo</p> <p>Chair: Gökhan Çuvalcıoğlu</p>	

2. SESSION		
HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Engineering
Chair: Gökhan Çuvalcıoğlu		Chair: Buğra Sarper
Generators of F/R' Leibniz algebras Zeynep Özkurt		Measurements And Evaluation Of Electric Field Exposure Generated By Modem in Home Environment Mustafa Mutlu
Clique Matching Neighborhood Polynomial of Graphs Aldison M. Asdain , Rosalio G. Artes Jr.		The Effects Of Collector Plate Material On Fiber Fineness in Electrospinning Gonca Şimşek Gündüz
Fren simplicial homotopy to crossed module homotopy Hatice Gülsün Akay		Masked And Unmasked Face Recognition On Unconstrained Facial Images Using Hand-Crafted Methods Ali Torbati , Önsen Toygar
Local Lower Separation Axioms In Q-Reflexive Spaces Samed Özkan		Classification of Brain Tumors on MRI Images Using Deep Learning Architectures Samaneh Sarfarazi , Önsen Toygar
An Application Of Controlled Sets in Medical Diagnosis Sinem Tarsuslu(Yılmaz) , Gökhan Çuvalcıoğlu		

9 JULY 2023

INVITED SPEAKER

On the Scattering Problem for a Non-Self-Adjoint Boundary Value Problem

Hanlar Reşidoğlu

Chair: Gökhan Çuvalcıoğlu

COFFEE BREAK

Online Poster

Effect of production method on selected bioactive compounds and antioxidant activity of Japanese quince and quince fruit tinctures

Natalia Marat, Marzena Danowska-Oziewicz, Magdalena Polak-Śliwińska, Agnieszka Narwojsz

1. SESSION

HALL-A (Face to Face)-Mathematics

Chair: **Şehmus Fındık**

Best Approximation of Fixed Point Results in Generalized Metric Spaces
Nesrin Manav Tatar

Approximate Solutions Of The Modified Kratzer Potential Plus Screened Coulomb Potential in N-Dimensions
Aysel Özfidan

A Novel Methodological Framework To Identify The Criteria For Decision-Making Problems in Neutrosophic Fuzzy Environment
Ömer Faruk Görçün

HALL-B (Face to Face)-Engineering

Chair: **Buğra Sarper**

Corporate Carbon Footprint Calculation And Evaluation Of Mersin University Çiftlikköy Campus
Hasret KARAKAYA, Yasin ÖZAY, Nadir DİZGE

Active Packaging Films Incorporated With Essential Oils in Nanoemulsion Formulation
Natalia Marat, Aleksandra Purkiewicz, Didem Demir, Yasin Özay, Gulden Goksen

Smart Film Production By Including Bioactive Compounds
Aleksandra Purkiewicz, Natalia Marat, Didem Demir, Yasin Özay, Gulden Goksen

Using Fuzzy-Logic In Market Conditions For Efficient Portfolio Selection In The Casablanca Stock Exchange Abdelhamid Hamidi Alaoui	Determination Of Priority Areas For A Possible Underground Dam Around The Harsit Stream Basin Tuğba BOZKUŞ , Yusuf KAYA

COFFEE BREAK

2. SESSION	
HALL-A (ONLINE)-Mathematics	HALL-B (ONLINE)-Engineering
Chair: Gökhan Çuvalcıoğlu	Chair: Deniz Üstün
A Maximal Type Of Zagreb Index Büşra Aydın , Nihat Akgüneş	Biofuel Utilization in The Aviation Industry Emine Kahramaner , Özlem Ateş Duru
A Note On Higher Order Pell 2 ^s -IONS Hayrullah Özimamoğlu	Interaction Between Ret Protein Kinase And Curcumin And Resveratrol: A Molecular Docking Perspective Deniz Karataş
Some Properties Of Leonardo Sedenions Hayrullah Özimamoğlu	Second Order Model Reduction Of Higher Order Systems And Pid Controller Design Ali Yüce
Revolutionizing Matrix Computations: A Practical Approach For Efficient Calculation Of Matrix Sign Function Gül Karaduman	Automotive Industry Spare Parts Stock Management Abc Analysis Based Ahp Method Application Elife İrem Kal , Emel Yontar
Applications Of Selection, Determination And Decision Making in Education With The Help Of Fuzzy Logic Ali Sınar , Erhan Çetinkaya, Ahu Meryem Çuvalcıoğlu	
Examples And Applications Of Decision Making in The Field Of Education Using Intuitionistic Fuzzy Sets Erhan Çetinkaya , Ali Sınar, Ahu Meryem Çuvalcıoğlu	

LUNCH

INVITED SPEAKER

Challenges of PVT and Nano-based Thermal Property Enhancement of PVT-PCM Systems

Md. Hasanuzzaman

Chair: Buğra Sarper

POSTER FACE TO FACE

On An Eigenproblem Of The Fractional Sturm-Liouville Boundary Value Problem

Zeynep Geçit

3. SESSION

HALL-A (Face to Face)-Mathematics

Chair: **Şehmus Fındık**

Approximation By Bivariate Complex Stancu-Schurer Polynomials in Compact Disks

Nesibe Manav Mutlu

Approximation By Generalization Of Bernstein-Schurer Operators

Nursel Çetin, **Nesibe Manav Mutlu**

On Translation Surfaces

Beyhan Yılmaz, Aykut Has

Fractional Approach To Some Fundamental Concepts Of Surface

Aykut Has, Beyhan Yılmaz

Subprojectivity Domain of Finitely Generated Modules

Arbsie Yasin Shibeshi, Yılmaz Durğun

HALL-B (ONLINE)-Engineering

Chair: **Serap Şahinkaya**

Evaluation Of Environmental, Social And Economic Performances Of 81 Provinces Of Turkey With Data Envelopment Analysis

Gökçen Bayram, Ayşe Hande Erol Bingüler, B. Gültekin Çetiner

A Literature Survey Based On The Tabu Search Heuristic Method For The Solution Of The Multi-Dimensional And Multi-Objective Knapsack Problem And Variations

Gürkan Güven Güner

The Evaluation Of The Criteria To Be Taken into Account When Selecting Online Shopping Sites Based On Industry 4.0 With Using Dematel Method

Zeynep Durmaz, Erdem Aksakal

Optimizing CO2 Laser Cutting Parameters Of Polyethylene Polymeric Material Using Hybrid Entropy-Topsis Approach

Oğuzhan Der, Gökhan Başar, Muhammed Ordu

COFFEE BREAK

4. SESSION		
HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Engineering
Chair: Feride Tuğrul		Chair: Serap Şahinkaya
Novel Inequalities For Generalized Fractional Integrals Applied To Synchronized Convex Functions Abdullah Akkurt , Hüseyin Yıldırım		A Solution To The Solid Transportation Problem Using Lr Flat Numbers Nuran Budak , Nuran Guzel
On Kconformable Fractional Operators Sümeyye Ermeydan Çiriş , Hüseyin Yıldırım		A Compromise Solution To The Multi-Objective Solid Transportation Problem With The Uncertain Parameters Sedanur AKTÜRK , Nuran GÜZEL
A Petrov-Galerkin Method For Solving The Generalized Equal Width Equation Yusuf Tatlisu , Seydi Battal Gazi Karakoc		Thermal Diffusion-Based Boriding Effect On Hvof-Sprayed Aisi 316l Stainless Steel Coating Bülent Ermiş , Harun Mindivan
On Analytical Solutions Of Space-Time Fractional Variant Boussinesq Equation With Beta Derivative Nagehan Özdemir , Ayten Özkan		Sign Language Recognition Mobile Application For Turkish Language Erdem Demiroğlu , Furkan Ayakdaş, Asude Tanribuyurdu, Gülsüm Akkuzu Kaya

COFFEE BREAK

5. SESSION		
HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Engineering
Chair: Arif Bal		Chair: Buğra Sarper
Mixed İnteger Linear Programming Model For Optimizing University Exam Schedules Hamza Abunima , Burhan Pektaş, Nazmiye Kopacak, Özlem Şimşek		The Effects Of Cylindrical And Partial Pin Fins On The Cooling Performance Of A Minichannel Heat Sink Dondu Nur Turk , Kayhan Dagidir, Bugra Sarper, Orhan Aydın
Complex Matrix Version Of Hybrid Numbers		A Performance Analysis Comparison Of Machine Learning Algorithms in Detection Of Heart Disease

Çağla Ramis , Yasin Yazlık	Bahar Demirtürk, Bekir Can Telkenaroğlu
Generalized Kantorovich-Schurer-Type Operators Nursel Çetin	Investigation Of The Effect Of Nanoparticle Additives On The Refractive Index And Density Of Gasoline Mehmet Selman Gökmen , Mehmet Fatih Parlak, Hasan Aydoğan
Exact Solution Of The Schrodinger Equation in The Topologically Massive Space-Time Ali Tarsuslu , Kenan Söğüt	Simple Ways For Obtaining Transformation Matrices Of Serial Manipulators Samet Yavuz

10 JULY 2023

1. SESSION

HALL-A (Online)-Mathematics

HALL-B (Online)-Engineering

Chair: **Gökhan Çuvalcıoğlu**

Chair: **Aysel Özfidan**

A Fuzzy Soft Set-Based Approach To Identify Academic Dishonesty And Misconduct
Esra Korkmaz

Effect Of Different Build Orientations On Mechanical Properties Of Parts in Additive Manufacturing Technology
Derya Karaman And Hüccet Kahramanzade

Locally Recoverable Codes Based On The Matrices Derived From The Magic Squares
Rabia Zengin, Mehmet Emin Köroğlu

Pistachio Species Identification Using Histogram Of Oriented Gradient Descriptors And Support Vector Machine
Birkan Büyükarikan

Cyclic Dna Codes Over Mixed Alphabets
Tulay Yıldırım

An Innovative Approach for Enhancing Traffic Flow: Decentralized Traffic Signal Split Control Method
Serap Ergün

Finite Element Method For The Nonlocal Elliptic Problem With A \mathbb{P}^k -Kirchhoff-Type Operator
Mahamat Saleh Daoussa Haggat, Mohamed Mbehoul

Addressing the Challenge of Traffic Congestion: An Innovative Approach to Optimize Traffic Signal Control for Improved Traffic Flow
Serap Ergün

COFFEE BREAK

2. SESSION

HALL-A (Face to Face)-Mathematics	HALL-B (Online)-Engineering
Chair: Şehmus Fındık	Chair: Münir Süner
On Derivations Of Free Bicommutative Algebras Şehmus Fındık	Applying The Artificial Bee Colony Algorithm: Enhancing The Efficiency Of A Hydrogen-Based Hybrid Renewable Energy System Aykut Fatih Güven
On Fuzzy Boolean Algebra With Respect To New Fuzzy Logic Conjunction Gökhan Çuvalcıoğlu, Gül Karadeniz Gözeri	Vislit-Test: Designing Effective Visualization Literacy Assessment Test Elif E. Fırat
(α, β) -Interval Valued Intuitionistic Fuzzy Subgroups Arif Bal , Gökhan Çuvalcıoğlu	A Guideline To Designing Crowdsourced Online Experiments For Evaluating Visualization Literacy Elif E. Fırat
Approach To Intuitionistic Fuzzy Sets With Comparative Examples Of Decision Making Methods In Different Fields Feride Tuğrul , Mehmet Çitil, Gökhan Çuvalcıoğlu	Numerical Simulation Of Graphene/N-Ws ₂ /A-Si:H(I)/P-Csi/Ag Hit Solar Cells Nahide Karabulut , Büşra Aydın, Çağlar Duman

COFFEE BREAK

3. SESSION

HALL-A (Online)-Mathematics		HALL-B (Online)-Engineering	
Chair: Feride Tuğrul		Chair: Münir Süner	
A New Approach For Score Function On Q-Rung Orthopair Fuzzy Sets Ali Köseoğlu		Investigation Of Convection Heat Transfer Coefficient Effects On Thermal Energy Storage Performance With Pcm/Graphite Matrix Composite Sare Mitincik , Mustafa Yusuf Yazici	
Convex Independent Common Neighborhood Polynomial Of Graphs Amelia L. Arriesgado , Rosalio G. Artes Jr.		Impact Sliding Wear Behaviour Of Thermally Oxidized Ti–6Al–4V Alloy Ayşenur Eğercioğlu , Harun Mindivan	
On A General Inclusion Theorem Hikmet Seyhan Özarslan And Bağdagül Kartal		Analysis Of Heating And Cooling Degree Day Values For Tra2 Region Provinces Galip Kaltakkiran	
Solvability And Guh Stability Results Of Fuzzy NOnlinear Abc-Fractional Coupled System Aziz El Ghazouani , M'hamed Elomari And Said Melliani		Investigating The Time-Domain Sensitivities To NOnlinear Hydrodynamic Interactions Of A Resonant Micro-Cantilever With Glycerol-Water Solutions in Multi-Frequency Operations Cağrı Yılmaz	
On Modeling on Multiplicative Calculus for Population Growth Yusuf Ziya Altay, Aslı Bucak, Sertaç Göktas			

LUNCH

INVITED SPEAKER

ON INTUITIONISTIC FUZZY PRIMARY DECOMPOSITION OF INTUITIONISTIC FUZZY IDEALS

POONAM K. SHARMA

Chair: Gökhan Çuvalcıoğlu

POSTER FACE TO FACE

Robustness Control Ciciut for Logic Circuit Integrations with PIC and Arduino Microcontrollers

Mehmet Ersin Aytekin, Dönay Kayahan

Structural Analysis Development Study Of The Rear Cover Used in The Trailer Vehicle

Onur Can Kırıt, Mehmet Vurgun

Reducing The Use Of High-Strength Sheet Metal in Timber Carrier Semi-Trailer Vehicles

Mehmet Vurgun, Onur Can Kırıt

R58-03 Application in Aluminum Chassis

Mustafa YILMAZ, Akin ZENGİN, Onur Can KIRIT, Necip Ahmet KÖROĞLU

4. SESSION

HALL-A (Online)-Mathematics

Chair: **Arif Bal**

A Note On Fuzzy Product Rule

Tahir Ceylan

Fixed-Point Theorems Via Fuzzy-Interpolative Kannan Type Contraction

Meryem Şenocak

Positive Toeplitz Operators Between Harmonic Bloch Spaces On The Ball

Ömer Faruk Doğan

Existence Theorems For Set-Valued Operators in Wc-Banach Algebras

Cesim Temel And **Müberra Selah**

HALL-B (Face to Face)-Engineering

Chair: **Veysel Alcan**

An Encoding –Decoding Algorithm Based On Narayana Numbers

Engin Eser, **Bahar Kuloğlu** And Engin Özkan

New Number Sequences Built On Hybrid Numbers

Mine Uysal And Engin Özkan

A New Approach To Gadovan Numbers

Engin Özkan, **Engin Eser**, Mine Uysal

Microwave Energy-Based Hybrid Nanomaterial Preparation Approach For Energy Storage Purposes

Selçuk Poyraz

COFFEE BREAK

5. SESSION

HALL-A (Online)-Mathematics		HALL-B (Face to Face)-Engineering	
Chair: Şehmus Fındık		Chair: Buğra Sarper	
An Action Of Dihedral Group Nazar Şahin Öğüşlü		Multi-Objective Optimizations Of Circular And Square Ducts Under Laminar Flow And Constant Wall Temperature Conditions Muhammet Nasif Kuru	
Invariant Algebras in Polynomial Rings Nazar Şahin Öğüşlü		Evaluation Of The Effects Of Visual And Somatosensory Inputs On Balance in The Elderly By Using Machine Learning Veysel Alcan	
Multiplication Rules For Pointwise Inner Automorphisms in Lie Algebras Ela Aydın		Theoretical Investigation Of Alternative Fuels Which Can Be Used On Ships Münir Süner , Bugra Sarper, Servet Uzel, Nedim Kizilkaya	
Fekete-Szegő Problem For Two New Subclasses Of Bi-Univalent Functions Defined By Bernoulli Polynomial Yunus KORKMAZ , İbrahim AKTAŞ			

COFFEE BREAK

6. SESSION

HALL-A (Online)-Mathematics		HALL-B (Online)-Mathematics	
Chair: Feride Tuğrul		Chair: Münir Süner	
Fractional Prey-Predator Model With Linear Functional Response, Prey Refuge, Fear And Carry-Over Effect Ercan Balcı		On Reliability Analysis Of Reference Intervals in Medicine Gülşen Kiling	

An Almost Unbiased Ridge Estimator in Beta Regression Yasin Asar	On Isolated Subsemigroups Of Order-Decreasing Transformation Semigroups Melek Yağci
Investigating Solitary Wave Solutions Of The Benjamin-Ono Equation For Modelling Internal Waves in Deep Water Gülsen Kiliç, Serbay Duran , Birgül Binzet	Relative Controllability Of The μ -Caputo Fractional Delayed System With Impulses Mustafa Aydın
	Brief Qualitative Properties Of The Regularized Prabhakar Fractional System Mustafa Aydın

11 JULY 2023

1. SESSION

HALL-A (ONLINE)-Mathematics

Chair: **Feride Tuğrul**

Generalized Symmetric Bi-Derivations Of Up(Bcc)-Algebras

Damla Yilmaz

Modeling And Analysis Of Capacitated Nonlinear Network Traffic Assignment Problem

Hasan Dalman

A Dynamic Approach To The Effect Of Harvesting

Seval Işık, Figen Kangalgil

Role Of The Weak Allee Phenomena On A Predator-Prey Model

Figen Kangalgil, **Seval Işık**

HALL-B (ONLINE)-Engineering

Chair: **Buğra Sarper**

The Influence Of The Lactation Period And The Type Of Modified Milk On The Content Of Essential Amino Acids in Human Milk And Infant Formula

Aleksandra Purkiewicz, Kinga Szajkowska, Jacek Nowakowski, Renata Pietrzak-Fiećko

On The Exponential Stability Of Stationary And Perturbed Implicit Systems

Nor El-Houda Beghersa, Mehdi Benabdallah, Mohamed Hariri

Elimination Of Actuation Singularities Of Kinematically Redundant Rpr-Rpr Planar Parallel Robots

Mustafa Özdemir And **Muhammed Yasir Çubuk**

INVITED SPEAKER

HALL-A

TOPOLOGICAL INDICES OF FUZZY GRAPH

MADHUMANGAL PAL

Chair: Şehmus Fındık

HALL-B

POSTER ONLINE

Design of Load Lifting Eyebolts and Standardization with Static Tests

Yasin AYGÜL

On A One Type Fractional Sturm-Liouville Problem

Pınar TÜRKMEN

COFFEE BREAK

2. SESSION

HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Engineering	
Chair: Feride Tuğrul		Chair: Buğra Sarper	
On Infra Fuzzy-Soft Topological Spaces Arife Atay		Solving Nonlinear She Equations Using Harris Hawks Optimization Algorithm Yasin Bektaş	
On Leap Zagreb Indices Of A Special Graph Obtained By Semigroups Yaşar Nacaroglu		The Necessity Of Using Recycled Waste Aggregate in Türkiye Eren Yağmur	
The Gradient And Partial Derivatives Of Bicomplex Numbers: A Commutative-Quaternion Approach Ali Atasoy		A Review On Latest Developments in Assembly And Temporary Shelters For Natural Disasters İrem Karakaya, Alev Taşkın	
Comparison Of Predictors/Estimators in General Linear Models With Stochastic Restrictions Nesrin Güler And Melek Eriş Büyükkaya		Carbon Footprint Calculation And Mitigation Strategies For The Transportation Against Climate Change: Pestel Analysis Şölen Zengin, Fatma Ersoy Duran, Emel Yontar	
Numerical Solutions Of Conformable Time-Fractional Klein-Gordon Equation With Proportional Delay By The Novel Method Halil Anaç		Deciding Applicability Of Blockchain İn Avionics Systems Ayşenur Sayıl, Harun Çelik	

3. SESSION

HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Engineering	
Chair: Arif Bal		Chair: Buğra Sarper	
Approximation Of Max-Product Truncated Baskakov Operators By Fuzzy Numbers Ecem Acar And Sevilay Kırıcı Serenbay		Process Improvement With Value Flow Mapping Method For Low Density Polyethylene Recycling Processes Emre Can Temiz , Emel Yontar	
Geodetic Index Of Graphs Glee Ann L. Tampipi And Rosalio G. Artes Jr.		Investigation Of The Capacity Factor Of The Ege Region Wind Power Plants According To The Real Productions İsrafil Karadöl	
Induced Path Polynomials Of The Join And Corona Of Graphs Cerina A. Villarta , Rolito G. Eballe And Rosalio G. Artes Jr.		Comparison Of Reactivity Feedback Coefficients Obtained From Mcnp6.2 And Serpent Monte Carlo Codes Elif Ahsen Baştuğ And Bahram R. Maleki	
Statistical Cauchyness With Deferred Cesáro Mean in Asymmetric Context Zeynep Hande Toyganözü		Numerical Investigation Of The Thermal Performance Of A Liquid Cooled Battery Pack Soner Birinci , Mehmet Sağlam, Bugra Sarper, M. Yusuf Yazici And Orhan Aydın	
Existence Results for Antiperiodic Ψ -Caputo Fractional Differential Equations with p-Laplacian Operator Walid Benhadda , M. El-Omari, A. Kassidi, A. El Mfadel			

LUNCH	
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4. SESSION			
HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Engineering	
Chair: Arif Bal		Chair: Münir Süner	
Solvability Of A System Of Third-Order Difference Equations Merve Kara, Şule Devecioğlu		Quality Classification of Ceramic SanitaryWare Products with Machine Learning Techniques Sedanur Şimşek , Erdener Özçetin	
Properties Of Generalized Semi Closed Sets in The Topology		Computational Aeroacoustic Modeling Of Supersonic Cavity Flows Using Open-Source Flow Solvers	

Havva Taşkiran , Ayhan Erciyes	Ramazan Kaba , Melike Nikbay, Baha Zafer
Some Numerical Approaches For Computing The Hankel Transform Meryem Güney , Zekeriya Ustaoglu	Production Of Sucker Rod And Determination Of Its Mechanical Properties And Localization Of This Product Kürşat Kahya, Dergah Uysal , Gökhan Acıyien
	Detection Of Effect Of Smart Robot Automation On Quality And Efficiency in Production Kürşat Kahya, Seren Geçgel , Seda Yücel

COFFEE BREAK

5. SESSION

HALL-A (ONLINE)-Mathematics	HALL-B (ONLINE)-Engineering
Chair: Gökhan Çuvalcıoğlu	Chair: Münir Süner
Approximate Solutions Of The Integro-Partial Fractional Equation Involving Tempered Ψ -Caputo Fractional Derivative Sami Baroudi , M'hamed Elomari, Ali El Mfadel And Abderrazak Kassidi	Investigation Of The Effect Of Types And Particle Sizes Of Reinforcements On Composite Hardness Of Al6061 Alperen Dindar , Merve Tur, Türker Türkoğlu, Sare Çelik
Totally Umbilical Semi-Invariant Submanifolds Of Poly-Norden Manifolds Şerife Nur Bozdağ	A Performance Analysis Of Attack Individual Pension Funds By A System Dynamics Simulation Approach Muhammed Ordu
Some Fixed Point Applications Of F-Modular Metric Nesrin Manav Tatar, Zehra Dogan , Duran Turkoglu	Ultrasonic Pilot Reactor Design: Temperature, Pressure And Rotary Control Can Be Used in The Production Of Hygroscopic Materials Sinan Köse , Fatma Ulusal, Salih Hakan Yetgin
Open-Loop Control Vs Closed-Loop Control in Smart Irrigation: A Game Theoretical Perspective Ali Hamidoğlu	The Use Of Unmanned Aerial Vehicles in The 3d Documentation Of Historical And Cultural Heritage: The Case Of Ceyhan Kurtkulagi Caravanserai Enis Arslan , Ali İhsan Şekertekin

COFFEE BREAK

6. SESSION		
HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Engineering
Chair: Arif Bal		Chair: Münir Süner
Preconditioning Linear Systems Using Kronecker Sum Decomposition Youssouf Mezzar		Faults And Suggestions Detected In Distribution Panel And Transformers in Power Plants Hale Bakir
Nonlinear Differential Equations According To The Bishop Parallel Transport Frame Fatma Bulut		Prediction Of Covid-19 Cases Using Unidirectional Lstm, Bidirectional Lstm, And Deep Neural Network Applications Baha Şen, Büşra Demirbaş
A Generalization Of The Linear Positive Operators By Using The Special Polynomials Kadir Kanat, Melek Sofyalioglu, Verda Karadaş		

COFFEE BREAK

7. SESSION		
HALL-A (ONLINE)-Mathematics		HALL-B (ONLINE)-Mathematics
Chair: Gökhan Çuvalcioğlu		Chair: Münir Süner
Decompositions And Inverses Of Some Lower Triangular Matrices Cahit Köme And Kadir Hilal		Compositions Of Permuting N-Derivations With Commutativity For Associative Rings Mehsin Jabel Atteya
On A New Class Of Hyperbolic Fibonacci Functions Via Some Special Polynomials Sure Köme And Yasin Yazlik		Some Results On Deferred Cesaro Statistical Convergence Of Order A in The Probability Spaces Uğur Değer, Kübra Uzun
On Some Natural Geometric Differential Operators Razvan M. Tudoran		Spacelike F-Rectifying Curves in Minkowski Space Hülya Gün Bozok, Önder Korkmaz
The Selfadjoint Schrödinger Operator On The Half Line With A Real-Valued Compactly Supported Potential Mehmet Ünlü		The Comparison Between Effects Of Heterogeneous And Homogeneous Double Layered Compressible Elastic Media On Dark Solitary Sh Waves Ekin Deliktaş Özdemir

Contra Continuity For Λ -Strong B-I-Closed Sets Seyfettin Fidan , Aynur Keskin Kaymakci	Approximate Solutions Of Some Fredholm Integral Equations Associated With Lucas Polynomials Çağla Türkoğlu
Almost Supra B-Continuous Functions Fatma Talas , Aynur Keskin Kaymakci	Similarity Measure in Bipolar Fuzzy Sets And its Application To Multi-Attribute Decision Making Method Gözde Sever , Zarife Zararsiz

CLOSING CEREMONY Chair: Gökhan Çuvalcıoğlu
