VI. Kadın Matematikçiler Derneği Çalıştayı

Bildiri Özetleri

Matematik Bölümü
Selçuk Üniversitesi

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Kadın Matematikçiler Derneği (TKMD) Çalıştayları, Türkiye' de bir grup kadın matematikçinin 2012 yılında kurmuş olduğu Kadın Matematikçiler Derneği tarafından 2014 yılından bu yana her yıl düzenli olarak yapılan bir sempozyumdur. Bu çalıştayların amacı, kadın araştırmacıların, yüksek lisans ve doktora öğrencilerinin araştırma konularını, fikirlerini ve tecrübelerini paylaşabilecekleri bir platform oluşturmaktır.

TKMD çalıştaylarının birincisi Gebze Yüksek Teknoloji Enstitüsü' nün (2014), ikincisi Sivas Cumhuriyet Üniversitesi' nin (2015) ve üçüncüsü Dokuz Eylül Üniversitesi' nin (2016) , dördüncüsü Orta Doğu Teknik Üniversitesi'nin (2017), beşincisi de Dicle Üniversitesi'nin (2018) Matematik Bölümlerinin evsahipliğinde gerçekleşmiştir.

Altıncı TKMD çalıştayına evsahipliği yapmayı kabul eden Selçuk Üniversitesi, Matematik Bölümü' ne teşekkür ediyoruz.

Çalıştayımızda, üç ana konu başlığı altında çağrılı konuşmalara ve sunumlara yer veriyoruz. Altıncı çalıştay; Cebir, Uygulamalı Matematik ve Topoloji alanlarında konuşmalara ve poster sunumlarına ayrılmıştır. Çalıştayda yer alan konuşma ve posterlerin özetlerini, soyadı sırasına göre elinizdeki kitapçıkta bulabilirsiniz.

Son olarak, bu çalıştayın gerçekleşmesinde emeği bulunan Bilim Kurulu üyelerine, Düzenleme Kurulu' nda yer alan Selçuk Üniversitesi, Matematik Bölümü akademik personeline ve organizasyonda yardımcı olan idari personele özverili çalışmalarından dolayı teşekkür ediyoruz.

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İçindekiler

Impulse Effect on the Mathematical Models with Delay

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It is now recognized that the theory of impulsive differential equations appears as a natural description of several real processes subject to certain perturbations whose duration is negligible in comparison with the duration of the process. Mathematical models involving impulse effects have recently been introduced in population dynamics such as vaccination, population ecology, drug treatment, the chemostat, the tumor-normal cell interaction, etc. On the other hand, its well known that delay differential equations with continuous time or discrete time play a very important role in modern applied mathematical models of real processes arising in physics, population dynamics, chemical technology and economics.

In this talk, we introduce impulsive differential equations as well as delay differential equations with piecewise constant argument. Asymptotic behavior of the solutions of an impulsive delay population model will be investigated. The results are compared with the non-impulsive case. Finally, we give some examples to illustrate the results.

Keywords. Impulse, delay, piecewise constant argument, population model.

Applications of Numerical Analysis

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Numerical analysis concerns with the development and study of methods/algorithms for solving mathematical problems. First, a mathematical model is formulated for an observed phenomenon in biology, chemistry, physics, economics or any other scientific or engineering discipline. In practice most of these mathematical models are difficult or impossible to solve analytically. In order to solve such a model approximately on a computer, the problem is approximated by a discrete one. Numerical analysis designs the methods and algorithms which approximately solve the mathematical problem efficiently, accurately and reliably.

In this talk, we shall illustrate the need and the use of the general ideas behind numerical methods giving some examples from physical situations. Recent applications are shown from magnetohydrodynamic duct flows.

Keywords. Numerical analysis, MHD, duct flow.

L-Functions of Elliptic Curves

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Let E be an elliptic curve over the field of rational numbers $\mathbb{Q}$ given by the minimal global Weierstrass equation:

$$E : y^2 + A_1xy + A_3y = x^3 + A_2x^2 + A_4x + A_6$$

and let Δ_E be its discriminant. For each prime p we put

$$a_p = p + 1 - \#E(F_p),$$

where $E(F_p)$ is the reduction of E modulo p. The L-function associated to E is given by

$$L(s, E) = \prod_{p|\Delta_E} \frac{1}{1 - a_p p^{-s}} \prod_{p\nmid\Delta_E} \frac{1}{1 - a_p p^{-s} + p^{1-2s}}.$$

The infinite product above is convergent for $Re(s) > 3/2$ and therefore we can expand it into a series $L(s, E) = \sum_{n\geq 1} a_n n^{-s}$.

In this talk, we show that the set of positive integers n such that $|a_n|$ is a generalized Fibonacci number has asymptotic density 0.

Keywords. Functions of elliptic curves, linear recurrence sequences

Inverse Unsteady Natural Convection of Nanofluid

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A numerical investigation of unsteady natural convection flow in a square cavity filled with $Cu-$water nanofluid is performed. In the direct problem, the enclosure is bounded by one isothermally heated vertical wall at temperature T_m and by three adiabatic walls. In the inverse problem, the enclosure is bounded by right hostile wall on which no boundary condition can be prescribed or measured and by a left accessible wall on which both the boundary temperature and heat flux data are overspecified. Both direct and inverse problem are solved by using the dual reciprocity boundary element method (DRBEM) with the fundamental solutions of Laplace and modified Helmholtz equations. Inhomogeneities are approximated with radial basis functions. Computations are performed for several values of Rayleigh number (Ra), Reynolds number (Re) and solid volume fraction (ϕ), and their results are given for three forms of heat flux namely: steady heat flux ($q = q(y)$), time dependent uniform heat flux ($q = q(t)$) and non-uniform time dependent heat flux ($q = q(y, t)$).

Keywords. Inverse problem, DRBEM, natural convection, nanofluid.

Evaluation of Patients with Prostate Cancer Risk using Fuzzy Topsis Method and Artificial Neural Network

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In this paper we present an example in medicine which aims to find the patients with high prostate cancer risk using a multi-criteria decision making method. Biopsy is required for a definitive diagnosis and the doctor should refer to this procedure. Therefore we design a system to diagnose patients without performing biopsy. We study how any doctor should use this method. For this purpose, we develop a project using the fuzzy TOPSIS method [1]. We use "Visual Studio 2017, Microsoft Form App (.Net Framework) Studio Visual C ♯" programming language to make the method used easily by any doctor. We add "Microsoft SQL Server Management Studio" database to our project so that the program automatically records the data. Thus, a doctor can see patients who are evaluated by other doctors. Another important part of the study is that it can be applied to any patient group. Also, an artificial neural network [2] related to the consistency of convergence coefficients calculated by the Fuzzy TOPSIS method [3] is established.Thus, we understand the accuracy of the results from the Fuzzy TOPSIS method. Our datas are prostate specific antigen (PSA), free prostate specific antigen (fPSA), prostate volume (PV) and age factors of 78 patients from Necmettin Erbakan University Meram Medicine Faculty.

Keywords. Uncertainty modelling, artificial neural network, multi-criteria decision making, prostate cancer, Fuzzy TOPSIS method.

This is a joint work with Şaziye Yüksel, Zehra Güzel Ergül and Orhan Dalkılıç.

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Analytical and Numerical Solutions of High-Order Nonlinear Ordinary Delay Differential Equations by Chebyshev Wavelets

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The purpose of this study is to illustrate the use of the Chebyshev wavelet method in the solution of high-order nonlinear ordinary differential equations with variable, proportional and constant delays. The main advantage of using Chebyshev polynomials lies in the orthonormality property, which enables a decrease in the computational cost and runtime. The other advantage is that it does not require domain discretization. The application of the method transforms the nonlinear equation to a system of algebraic equations. The method is applied to five differential equations up to sixth order, and the results are compared with the exact solutions and other numerical solutions when available. The accuracy of the method is presented in terms of absolute errors. The numerical results demonstrate that the method is accurate, effectual and simple to apply.

Keywords. Chebyshev wavelets, nonlinear ordinary differential equations, variable delay, proportional delay, constant delay

Some Characterizations of *b-closed* Spaces, γ-*connected* Spaces, *b*-T_2 Spaces, *b-regular* Spaces and γ-*normal* Spaces by Using *z-open* Sets

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It is well known that the notions of regular open sets and then *δ-open* sets are important on topology. So, we recall that the notions of *z-open* sets which is defined by A.I. EL-Magharabi and A.M. Mubarki [1]and necessary properties of these sets. Besides, authors defined the notions of *b-θ-open* sets and *b-regular* sets. On the other hand, the notion of *b-open* sets is defined by D. Andrijević, [2]. A.I. EL-Magharabi and A.M. Mubarki [1] have given the notion of z-open sets is stronger than the notion of *b-open* sets. We obtain some characterizations of notions *b-closed* spaces, *γ-connected* spaces, *b*-T_2 spaces, *b-regular* spaces and *γ-normal* spaces via the notions of *z-open* sets, *b-θ-open* sets and *b-regular* sets.

Keywords. *z-open* sets/*z*-açık kümeler, *b-open* sets/*b*-açık kümeler, *δ-semi-open* sets/*δ-ön*-açık kümeler, *preopen* sets/*yarı*-açık kümeler, *e-open* sets/*e*-açık kümeler.

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Analytical and Numerical Solutions of Neutral Differential Equations with Proportional Delays by Legendre Wavelets

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The aim of this study is to solve neutral differential equations with proportional delays by using Legendre wavelet method. A neutral differential equation is a type of functional differential equations and it depends on past and present values of a function and derivatives of that function with delays. Functional differential equations are essentially with proportional delays, constant delays or time-dependent delays. We consider the neutral differential equations with proportional delays in the form

$$(y(t) + cy(\alpha_p t))^{(p)} + dy(t) + \sum_{j=0}^{p-1} Q_j(t)\, y^{(j)}(\alpha_j t)) = g(t), \quad 0 \le t \le 1$$

Using orthonormal polynomials is the main advantage of this method since it enables a decrease in the computational cost and runtime. Some examples are displayed to illustrate the efficiency and accuracy of the proposed method. Numerical results are compared with various numerical methods in literature and show that the present method is very effectual in solving neutral differential equations with proportional delays.

Keywords. Legendre wavelets, neutral differential equations, proportional delay.

This is a joint work with Sevin Gümgüm and Demet Ersoy Özdek.

Persistent Homotopy and Van Kampen Theorem

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Topological persistence studies features of shapes at a variety of scales. Mostly, topological persistence has used homological information and this persistence is called as persistence homology. Persistent homology studies evolution of topological features captured by homology groups (e.g. connected components, holes) throughout the filtration. Letscher ([1]) extended persistence to homotopy groups. He applied persistence to detect if a complex is knotted and if that knotting can be undone in a larger complex since homotopy groups are a complete invariant for knots.
Van Kampen theorem is a method which provides an easier way for computing fundamental groups. In this talk, we show that persistent homotopy benefits from Van Kampen Theorem.

This work is supported by TUBITAK Project No 117F015.

Keywords. Persistence, fundamental group, Van Kampen.

This is a joint work with Mehmetcik Pamuk and Mehmet Ali Batan.

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On Hurwitz Stability of Matrix Families

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Consider a family of interval matrices is defined

$$\mathcal{A} = \{A \in \mathbb{R}^{n\times n} : A^- \leq A \leq A^+\} \tag{1}$$

where $A^- = (a_{ij}^-)$ and $A^+ = (a_{ij}^+)$ are fixed matrices. Family (1) is called Metzler interval matrix family if for all $A \in \mathcal{A}$ off diagonal elements of A are nonnegative. Such matrices are arises in a number of fields, for example communication networks [4], biology [5], economics [6], etc. The problem of determining the Hurwitz stability of such matrix families is important [1]. In this study for nth order Metzler interval systems we consider the problem of existence of common diagonal solutions for the Lyapunov matrix inequality. To this end, a simple necessary and sufficient condition for the Hurwitz (diagonal) stability of (1) is derived. Numerical examples illustrate the applicability of the theoretical result.

Keywords. Interval systems, Lyapunov matrix inequality, common solution, Hurwitz stability.

This is a joint work with Bengi Yıldız.

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On the Classification Problem of Symplectic Fillings

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A weak symplectic filling of a contact manifold (X, ξ) is a symplectic manifold (W, ω) with $\partial W = X$ such that $\omega \restriction_{\xi} > 0$. A strong symplectic filling of a contact manifold (X, ξ) is a symplectic manifold (W, ω) with $\partial W = X$ such that ω is exact near the boundary and a primitive α for ω can be chosen (that is $d\alpha = \omega$ near ∂W) such that $\alpha|_{\partial W}$ is a contact 1-form for ξ. A minimal symplectic filling of a contact manifold (X, ξ) is a symplectic filling (W, ω) which does not contain any symplectically embedded spheres of self intersection number -1.
Our purpose in this talk is to introduce minimal strong symplectic fillings of the canonical contact structure on some Seifert fibered spaces over spheres and to classify them.

Keywords. Symplectic fillings, contact structures

This is a joint work with Mohan Bhupal.

Bir Yarıhalka Üzerinde Tanımlanan Birleşimsel Esnek k-İdeallerin Bazı Özellikleri

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Esnek küme, 1999 yılında Molodtsov tarafından şu şekilde tanımlanmıştır:
U evrensel küme ve E parametreler kümesi olsun. U üzerinde bir esnek küme, $f_A : E \to P(U)$ fonksiyonu ile tanımlanır. Bir f_A esnek kümesi

$$f_A = \{(x, f_A(x)) : x \in E\}$$

şeklinde gösterilir[2].
Maji ve ark.[1] ise daha sonra esnek küme üzerindeki işlemleri tanımlayarak bir çok çalışmanın önünü açmıştır.
Bu çalışmada, ilk olarak bir yarıhalkanın esnek ideali yardımıyla tanımlanan birleşimsel esnek k-idealler hakkında bilgi verilecektir. Daha sonra birleşimsel esnek k-ideallerin bazı cebirsel özellikleri incelenecektir.

Anahtar Kelimeler. Birleşimsel esnek küme, birleşimsel esnek k-ideal, esnek k-çarpım, esnek homomorfizma.

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Elastodynamics of 2D Quasicrystals in Inhomogeneous Media

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According to the linear elastic theory, the basic equations of 2D quasicrystals are given by the following equations:

$$\varepsilon_{ij} = \frac{1}{2}(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i}),\ i,j = 1,2,3 \tag{1}$$

$$w_{\alpha l} = \frac{\partial w_\alpha}{\partial x_l},\ \alpha = 1,2;\ l = 1,2,3 \tag{2}$$

where $x = (x_1, x_2, x_3) \in R^3$, $t \in R$; u_i and w_α are phonon and phason displacements; ε_{ij} and $w_{\alpha j}$ are the phonon and phason strains respectively, ([1], [2], [3]).

In this talk, initial value problem for (1) and (2) is considered. Existence of a unique solution of the problem is studied.

Keywords: Linear elastic theory, Hooke's law

This is a joint work with Ali Sevimlican

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An Application of Vague Sets in Medicine

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In recent years vague concepts have been used in different areas as medical applications, pharmacology, economics, engineering since the classical mathematics methods are inadequate to solve many complex problems in these areas. Traditionally crisp (well-defined) property P(x) is used in mathematics, i.e., properties that are either true or false and each property defines a set: x : x has a property P. Zadeh [3] defined fuzzy set theory for vagueness and the theory was appliead sevaral branches rapidly. Rough set theory which was proposed by Pawlak in 1982 [2] is another mathematical approach to vagueness to catch the granularity induced by vagueness in information. The classical rough set theory is based on equivalence relations. Molodtsov [1] initiated a novel concept of soft set theory which is a completely new approach for modeling vagueness in 1999. A soft set is a collection of approximate descriptions of an object. In this study we present an example in medicine which aims to find the patients with high prostate cancer risk using a multi-criteria decision making method. We presented a method and by using soft covering based rough sets to a medicine problem calculating the risk of prostate cancer.

Keywords. Soft Set, fuzzy soft set, multicriteria group decision making.

This is a joint work with Naime Demirtas and Saziye Yuksel.

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Decomposition of a Fuzzy Neutrosophic Soft Matrix

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In this talk, we present some results of the modal operators in fuzzy neutrosophic soft matrices with other operators using illustration. Transitive and c-transitive closures are defined and some results are proved on fuzzy neutrosophic soft matrices.

Keywords. Fuzzy neutrosophic soft set, fuzzy neutrosophic soft matrix, modal operators, implication operator.

This is a joint work with Aynur Yalçıner.

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On Numerical Solutions of the Lorenz System

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The Lorenz system was introduced by Ed N. Lorenz, a meteorologist, in 1963 ([1]). The system is expressed as following non-linear differential equations:

$$\frac{dx}{dt} = \sigma(y - x), \frac{dy}{dt} = rx - y - xz, \frac{dz}{dt} = xy - bz \tag{1}$$

The importance of this system is that the solutions of simple systems could exhibit rather complex behavior. Since it is impossible to get analytically the solution of the Lorenz system, numerical methods are widely used ([2], [3], [4],[5] etc.).

In this talk, we aim to examine numerical methods would allow to analyze a system with a chaotic structure such as the Lorenz system. For this purpose, we consider some well known numerical methods as Runge- Kutta method, differential transformation method and multi-step differential transformation method to obtain the numerical solution of Lorenz system. By comparing the results obtained, we present our observations about the advantages and disadvantages of each method.

Keywords. Lorenz system, Numerical solution

This is a joint work with Gülnur Çelik Kızılkan

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A Discretization of the Hadamard Fractional Derivative

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In this study, we construct non-polynomial spline curves of degree one to approximate for the left Hadamard fractional derivative in the Caputo sense in a finite domain, [1,2].

$$({}^{C}\mathcal{D}^{\alpha}_{a+}f)(x) = \frac{1}{\Gamma(1-\alpha)}\int_a^x \left(\log\frac{x}{\xi}\right)^{-\alpha}\left(\xi\frac{d}{d\xi}\right)f(\xi)\frac{d\xi}{\xi}, \quad 0 < a < x < b,\ 0 < \alpha \leqq 1$$

Then, we present a fractional difference operator by using the centered difference for ordinary derivative, [3]. We show that the approximation error for the above fractional derivative is of second order.

Keywords. Non-polynomial spline curves, difference operator, Hadamard fractional derivative.

This is a joint work with Melda Duman.

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Mathematical Oncology: Differential Equations to fight Cancer

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Cancer, one of the leading causes of death for humans, is characterized as abnormal growth of cells, called tumors. In order to be called malignant or cancerous, the irregularly growing cells must satisfy the following criteria: defying programmed cell-death, increased ability for cell-division, forming new blood vessels, invasion of tissue and causing metastasis. In this talk I will present a mathematical model of the stem cell hypothesis. The stem cell hypothesis states that cancerous stem cells are the reason tumors persist and grow, and proposes targeting treatments towards the cancerous stem cells instead of tumor cells. This is a differential equations-based model and provides insights into understanding the tumor-immune system dynamics and experimenting with different treatments.

Keywords. Mathematical modeling, cancer modeling, differential equations, immunotherapy, stem cell hypothesis.

This is a joint work with Elizabeth Zollinger, Allison Lewis and Sam Elliott.

Forced Convection Flow in a Channel with Symmetrically Sinusoidal Walls

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The present study focuses on the numerical solution of a forced convection flow in an infinitely long channel with symmetrically sinusoidal walls. The fluid kept at a constant cold temperature enters the channel with a velocity of parabolic profile while the isothermally heated sinusoidal walls have no-slip velocity conditions. The flow is considered to be laminar, incompressible, steady and two-dimensional for which the viscous dissipation is neglected [2]. Under the light of these assumption the fluid and thermal fields are governed by the stream function, vorticity and energy equations, and they are discretized by a boundary only nature technique called dual reciprocity boundary element method (DRBEM). The DRBEM enables one to discretize only the boundary of the computational domain which reduces the computational effort compared to the methods which discretize the whole domain [1]. The numerical simulations are performed for various values of Reynolds number and the amplitude of the sinusoidal walls in order to see their combined effects on the flow behavior and temperature distribution. The results reveal that the enhancement of the heat transfer significantly depends on the amplitude of the sinusoidal walls at high values of Reynolds number.

Keywords. Forced convection, DRBEM, sinusoidal wavy walls

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New Identities on the Generalization of Hankel Transform

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In this presentation, we introduce a new generalized Hankel transform and aim extend the integral transform tables. The Generalized Hankel transform defined by [2] as $\mathcal{H}_\nu[f(x,z);s,2] = \int_0^\infty z^2 J_\nu(sz^2) f(x,z)\,\mathrm{d}z$. We defined a new Generalized Hankel transform $\mathcal{H}_2$ as follows, $\mathcal{H}_\nu[f(x,z);s,2] = \int_0^\infty z^2 J_\nu(sz^2) f(x,z)\,\mathrm{d}z$, where ν, s and z are real numbers and $f(x,z)$ belongs to a certain type of function.We present some new Parseval-Goldstein type identities:

$$\int_0^\infty s\ddot{f}_\nu(x,s)\ddot{g}_\nu(x,s)\,\mathrm{d}s = \frac{1}{2}\int_0^\infty zf(x,z)g(x,z)\,\mathrm{d}z$$

$$\int_0^\infty z^2 f(x,z)\ddot{g}_\nu(x,s)J_\nu(sz^2)\,\mathrm{d}z = \int_0^\infty z^2 g(x,z)\ddot{f}_\nu(x,s)J_\nu(sz^2)\,\mathrm{d}z$$

where$\ddot{f}_\nu(x,s)$ and $\ddot{g}_\nu(x,s)$ are the $\mathcal{H}_2$ transform of the given functions.Following these identities derivative properties and the relation with the standard Hankel transform presented. In second section, we re-calculated some transforms of functions by using the $\mathcal{H}_2$ transform to show the practicality of the newly defined transform and checked the validity from [1]. Such as $\mathcal{H}_\nu[r^{2\nu-1}\exp(-ar^4);s,2]$.

Keywords. Generalized Hankel transform, Hankel transform, Bessel function.

This is a joint work with A. Neşe Dernek.

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A Numerical Approach for a Form of Blasius Equation

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The Blasius equation is one of the most famous equations of fluid dynamics and represents the problem of an incompressible fluid that passes on a semi-infinity flat plate [1]. In this study, we will apply a new technique empowered with Padé approximation to a form of classical Blasius equation [2,3]. The obtained result is in a good agreement with the ones found by other published methods [4].

Keywords. Blasius equation, Padé approximation, semi-infinity flat plate

This is a joint work with Haldun Alpaslan Peker.

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On Ads Modules with the SIP-extending

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In this talk, modules with the SIP-extending and the ads (briefly, SA-extending) are studied. A right R-module M is called SIP-extending if the intersection of every pair of direct summands of M is essential in a direct summand of M. A right R-module M has the absolute direct summand property (briefly, ads) if for every decomposition $M = A \oplus B$ of M and every complement C of A in M, we have $M = A \oplus C$. We will give some results on SA-extending modules.

Keywords. Ads module, SIP-extending module, SA-module.

This is a joint work with Figen Takıl Mutlu.

Crossed Homomorphisms on The Mapping Class Group

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Cohomology classes of the mapping class groups of orientable surfaces are related to the characteristic classes of surface bundles. Various crossed homomorphisms from the mapping class group of orientable surfaces $\Sigma_{g,1}$ with one boundary component to $H_1(\Sigma_{g,1};\mathbb{Z})$ were constructed to obtain a generator of the first cohomology class of the mapping class group. In this talk, we will show the relation between two different constructions given by Trapp in [1] and proposed by Furuta in [2] for obtaining crossed homomorphisms on the mapping class group using winding numbers.

Keywords. Crossed homomorphism, winding number.

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On Generalizations of n-ideals

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Let R be a commutative ring with identity and $Id(R)$ denotes the set of all ideals of R. In [1], n-ideals of commutative rings are introduced and studied. A proper ideal I of R is said to be an n-ideal if $r, s \in R$ and $rs \in I$ and $r \notin \sqrt{0}$, then $s \in I$. In this study, we generalize the concept of n-ideals in a commutative ring via a function $\phi : Id(R) \to Id(R) \cup \{\emptyset\}$. We investigate the properties of $\phi - n$-ideals in detail.

Keywords. $\phi - n$-ideal, n-ideal, ϕ-prime ideal, ϕ-primary ideal.

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Some Parseval-Goldstein type relations for generalized Bessel-Maitland Transform

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In this poster, we introduce the generalized Bessel-Maitland transform whose kernel involves generalized Bessel-Maitland function. Singh defined a generalization of the Bessel-Maitland function in 2011 as follows:

$$\mathcal{J}_{\nu,p}^{\mu,\gamma}(z)=\sum_{n=0}^{\infty}\frac{(\gamma)_{pn}(-z)^n}{n!\Gamma(\mu n+\nu+1)}$$

where $\mu,\nu,\gamma\in\mathbb{C}$; $\mathrm{Re}(\mu)\geq 0$, $\mathrm{Re}(\nu)\geq -1$, $\mathrm{Re}(\gamma)\geq 0$, $p\in(0,1)\cup\mathbb{N}$ and $(\gamma)_0=1$, $(\gamma)_{pn}=\dfrac{\Gamma(\gamma+pn)}{\Gamma(\gamma)}$ (see, [2]). Generalized Bessel-Maitland integral transform was introduced in [1], as follows for $\alpha,s\in\mathbb{C}$; $\mathrm{Re}(\alpha)\geq 0,\mathrm{Re}(s)\geq 0$,

$${}_{\alpha}\mathcal{H}_{\nu,p}^{\mu,\gamma}\{f(t);s\}=\int_0^{\infty}(st)^{\alpha}\mathcal{J}_{\nu,p}^{\mu,\gamma}(st)f(t)\,dt\ .$$

We present some new Parseval-Goldstein type identities, such as:

Lemma: ${}_{\alpha}\mathcal{H}_{\nu,p}^{\mu,\gamma}\{\mathcal{L}\{f(t);x\};y\}=\dfrac{y^{\alpha}}{\Gamma(\gamma)}\displaystyle\int_0^{\infty}\frac{f(t)}{t^{\alpha+1}}\,{}_2\Psi_1\left[\begin{array}{c}(\gamma,p),(\alpha+1,1)\\(1+v,\mu)\end{array}\middle|-\frac{y}{t}\right]dt.$

We give some examples for special cases of Parseval-Goldstein type identities. For example, setting $f(t)=t^{\beta}$ $(-1\leq \mathrm{Re}\beta\leq 0)$ in Lemma, we obtain

$$\int_0^{\infty}t^{\beta-\alpha-1}\,{}_2\Psi_1\left[\begin{array}{c}(\gamma,p),(\alpha+1,1)\\(1+v,\mu)\end{array}\middle|-\frac{y}{t}\right]dt=\frac{\Gamma(\beta+1)\Gamma(\alpha-\beta)\Gamma(\gamma-p(\alpha-\beta))}{\Gamma(1+\nu-\mu(\alpha-\beta))}\frac{1}{y^{\alpha-\beta}}.$$

Keywords. Laplace transform, generalized Stieljes transform, Parseval-Goldstein type theorems, generalized Bessel-Maitland function, Fox-Wright function.

This is a joint work with A. Neşe Dernek.

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Factoring Bilinear Maps through Convolution

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We consider a special class of continuous bilinear operators acting in a product of Banach algebras of integrable functions with convolution product. In the literature, these bilinear operators are called 'zero product preserving' –for Banach algebras– and 'orthosymmetric' –for vector lattices [1, 2, 3]. We prove a factorization theorem for these bilinear maps and investigate compactness and summability properties between them and the linear operator appearing in their factorization. We will finish the presentation by giving some integral representations and applications.

Keywords. Zero product preserving map, factorization, summability, integral representation.

This is a joint work with Enrique A. Sánchez Pérez and Ömer Gök.

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Bir Adi Diferansiyel Denklemler Dersinde Gözlemlenen Sosyomatematiksel Normlar

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Güncel matematik eğitimi alan yazınında matematik yapma ve bilmenin, özünde sosyal ve kültürel bir etkinlik olduğu görüşünün önem kazandığı görülmektedir [2]. Buna göre öğrencilerin matematiksel gelişimi açıklanırken sosyal ve kültürel süreçler önem kazanmakta, böylece bilgi, sınıf üyeleri (öğretmen ve öğrenciler) arasındaki etkileşimler ve gerçekleştirilen etkinliklere bu üyeler tarafından yüklenen anlamın müzakere edilmesi sürecinde yapılandırılmaktadır [1]. Bu bağlamda sınıf ortamlarının incelenmesi önem kazanmaktadır. Çünkü her sınıfın kendi mikrokültürü ve bu mikrokültüre ait kendi normları vardır. Sınıfta her türlü aktiviteyi ve tartışmayı karakterize eden bu normlardır. Bu çalışma kapsamında yüksek öğretim matematiğinde, özellikle uygulamalı bilimler için önemli konulardan biri olan adi diferansiyel denklemlerin öğretildiği sınıf ortamının sosyomatematiksel normları ortaya konmaya çalışılmıştır. Gözlemlenen normlardan bazıları şu şekilde ifade edilebilir:

- Adi diferansiyel denklemler dersi ≪öğretmen başlatır, öğrenci cevap verir, öğretmen değerlendirir≫ yöntemi ile yürütülür.
- Bir veya iki örnek sunmak, matematiksel soyutlama için yeterli olarak kabul edilir.
- Teorem ya da problemlerin genel durumlarından önce özel durumları içeren örnekler incelenmelidir.

Anahtar Kelimeler. Diferansiyel denklemler, sosyomatematiksel normlar

Bu çalışma Figen Uysal ile yapılmış ortak çalışmadır.

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Numerical Simulations of Kuramoto-Sivashinsky Equation by Chebyshev Based Differential Quadrature

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In this study, a numerical discrete derivative technique is used for solutions of Kuramoto-Sivashinksy equation [2]. According to the procedure, in space, differential quadrature algorithm [1] is adapted by using Chebyshev polynomials as base function, and fourth-order Runge-Kutta scheme is constructed to discretize time derivative. Numerical stability is also established based on eigenvalues of space discretized matrix. Numerical solutions are compared with exact and existing solutions. Shock wave propagation, periodic nature and chaotic behaviors of the model problem are simulated.

Keywords. Kuramoto-Sivashinsky equation, differential quadrature.

This is a joint work with Gülsemay Yiğit and Mustafa Bayram.

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On Computing Powers of Split Quaternions

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In this study, the well known methods of computing powers of split quaternions are investigated. However, a new method of computing powers of split quaternions is given with the use of 2×2 complex matrix representation. Furthermore, some examples are also stated to explain the obtained new method.

Keywords. Quaternions, split quaternions.

This is a joint work with Melek Erdoğdu.