# INTERNATIONAL WORKSHOP ON MATHEMATICAL METHODS IN ENGINEERING

**Cankaya University, Ankara, Turkey**
**April 27-29, 2017**

**Chair**

- Kenan TAS (Turkey)

**Co-Chairs**

- J.A.Tenreiro Machado (Portugal)
- Yangjian Cai (China)

**Prepared by**

**Kenan Tas**

**Dumitru Baleanu**

**Ayse Dogan Calisir**

**Seyma Kayan**



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## 1. Foreword

"Mathematical Methods in Engineering, MME-2017" is held at Cankaya University, Ankara, Turkey during April 27 – 29 , 2017.

This workshop brings together 363 researchers from academia, industry, and engineers from 36 different countries, including North and East America, India, Europe, and the Far East.

The main theme of this current workshop is Fractional Calculus and Nonlinear Analysis with Engineering Applications. However, talks are not restricted to these subjects. The topics to be covered in seven special sessions are *"Fixed Point Theory, Ulam Stability and Related Applications"*, *"New Developments in Applications of Fractional Calculus", "Vortex Beams and Their Use in Optical Links", "Fractional-order Systems: Analysis, Synthesis and Their Importance for Future Design", "Applications of the Group Preserving Scheme and Reproducing Kernel Method", "Spectral Theory and Its Applications" and "Operations Research (OR) Methods for Advanced Mathematical Modelling"*.

I applaud the outstanding efforts of the participants, who share an uncompromising commitment to excellence, and commend the dedication of the members of the International Scientific Committee who make this event possible.

I would like to express our gratitude to Cankaya University for their support and sponsorship of the meeting. All local organizing committee members with leadership of Dumitru Baleanu and Co-Chairs J.A.Tenreiro Machado (Polytechnic of Porto, Portugal) and Yangjian Cai (Soochow University, China) as well as organizers of Special Sessions, and the members of Organizing Committee and International Scientific Committee deserve heartfelt thanks.

Finally, we are celebrating the twentieth anniversary of Cankaya University by the year of 2017. In this very special occasion, on behalf of the International Scientific Committee, I also wish to express my sincere thanks to all academicians, students, and other participants who have made valuable contributions for the actualisation of this conference.

Kenan Tas ; Chair of MME 2017
Department of Mathematics,
Cankaya University, Turkey

## 2. International Scientific Committee

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## 5. General Information

### 5.1 CANKAYA UNIVERSITY

**Explore the Possibilities for a Quality Undergraduate and Graduate Education**

Cankaya University is a fast developing higher education institution in Ankara, the capital city of Turkey. Devoted to scientific research, the university also offers a free, multi-dimensional and interactive teaching-learning atmosphere in a variety of subjects. Getting involved in academic studies in a place where western and eastern cultures meet and intertwine to create new syntheses will undoubtedly lead to top-level motivation and enthusiasm**.**

**The Message of the Chair of Board of Trustees**

After spending over forty years in the field of education with Arı Primary School and Arı High School, an investment in higher education and research became inevitable. This endeavour was realized through the collaboration and genuine contribution of all the teaching and administrative staff as well as the thousands of young people who have attended these schools. In fact, this was the source of the motivation that led to the establishment of Cankaya University, the last link in our educational project. The official establishment of Cankaya University was finalised in 1997. We live in an age where each nation is trying to be a centre of excellence. Education, reliable and efficient education, is undoubtedly the basis for excellence in a world dominated by progress and competition. Having such a perspective, our goal is to train the students of Cankaya University in the best way possible through well-developed curricula in various fields. This academic institution will also provide its graduates with a solidly founded future, where employment opportunities will be open at large. As the founders of the University, it is our sincere hope and desire to interact with all academic and administrative members as well as with the students as members of the same family of Cankaya University**.**

**Sıtkı Alp**

**Chair of The Board of Trustees**

**Cankaya University aims at**

providing high-quality higher education and training at world standards,

producing knowledge and encouraging research and development at international level,

considering public service within its primary objectives,

raising individuals who love their country and nation in particular, but embrace all humanity in general.

**The Mission of Cankaya University is to**

do basic and applied research at world standards,

raise young people who know how to produce, transmit, and use knowledge, put into practice the principles of good management,

preserve and improve high-quality in education and training,

realize student and teaching staff mobility by cooperating with outstanding universities of the world, provide students with universal values and equip them with the ability of research and analytical thinking, encourage them to work and do research on interdisciplinary issues.

**The Fundamental Values of Cankaya University are:**

Scientific and interdisciplinary approach,

academic freedom,

support, care and tolerance towards students,

public service,

good administration,

participatory management,

lifelong learning,

equal treatment of all individuals without discrimination based on gender,

religion, language, race or nationality,

**The Message of the Rector:**

Cankaya University has four main objectives: to give high quality education, to do scientific research on an international scale, to encourage an innovative mindset that transform pure research outcomes to practical utility, and to enhance institutional internationalization. The realization of these objectives is of course dependent on several factors: experienced academic staff, rational administration and academic organization, and sufficient funding and infrastructure. The principal agent of success, however, is a person focused on success. This is why student motivation is of utmost importance, and our primary aim.

In line with these objectives, Cankaya University has an appropriate strategy: the selection of academicians; the scientific and educational needs of the area of employment; the psychological and practical requirements of the working environment; collaborating with international universities, and exchanging students and faculty with these universities. By means of this strategy, both the quality of education and that of academic publications is increasing. Cankaya University was first in 2014 in the field of Mathematics, and first in 2015 in the fields Business Administration, Marketing, Banking and Finance, and International Trade. In these two fields, the University is in the top 500 in the world.

Having underlined these principles and facts, I invite those who would like to have high quality education in a friendly environment to join Cankaya University family.

Best regards,

**Prof. Dr. Hamdi Mollamahmutoğlu**

**Rector**

## 5.2 Venue

The International Workshop "Mathematical Methods in Engineering" will be held in Cankaya University, BALGAT CAMPUS, Ogretmenler Caddesi, No: 14, 06530 Yuzuncuyil, Ankara, Turkey on Thursday, April 27, 2017 between 08:00-12:00 and on Friday, April 28, 2017 between 08:00-12:30.


The International Workshop "Mathematical Methods in Engineering" will be held in Cankaya University, CENTRAL CAMPUS, Yukariyurtcu Mahallesi Mimar Sinan Caddesi No:4 , 06790, Etimesgut Ankara, Turkey on Thursday, April 27, 2017 between 13:00-20:45, on Friday, April 28, 2017 between 13:00-21:30 and on Saturday, April 29, 2017 between 09:00-14:30.

## 6. Workshop Program*

<table>
<tr><td colspan="14">27 April Thursday, 2017</td></tr>
<tr><td>08:00<br>–<br>09:00</td><td colspan="13">Registration - BALGAT CAMPUS</td></tr>
<tr><td>09:30<br>–<br>10:00</td><td colspan="13">Opening Ceremony (Prof. Dr. Kenan TAS, Prof. Dr. J. A. Tenreiro MACHADO, Sıtkı ALP - President of the Board of Trustees)</td></tr>
<tr><td></td><td colspan="13">Red Amphi - Chair: Dumitru BALEANU</td></tr>
<tr><td>10:00<br>–<br>10:50</td><td colspan="13">Plenary Speaker: J. A. Tenreiro MACHADO<br>Title: Application of Fractional Calculus in Engineering Sciences</td></tr>
<tr><td>11:00<br>–<br>11:50</td><td colspan="13">Plenary Speaker: Albert LUO<br>Title: Periodic Motions to Chaos in Pendulum</td></tr>
<tr><td>12:00<br>–<br>12:30</td><td colspan="13">DEPARTURE TO THE CENTRAL CAMPUS</td></tr>
<tr><td>13:00<br>–<br>14:30</td><td colspan="13">LUNCH (CENTRAL CAMPUS)</td></tr>
<tr><td>14:30<br>–<br>16:30</td><td>Blue Amphi SPS 1-1</td><td>Red Amphi SPS 2</td><td>Amphi 2 SPS 3</td><td>Amphi 3 PS 1-1</td><td>Amphi 4 PS 2-1</td><td>Amphi 5 PS 3-1</td><td>Amphi 6 PS 2-2</td><td>L-111 PS 3-2</td><td>L-112 PS 3-3</td><td>L-113 PS 4-1</td><td>K-101 PS 1-2</td><td>K-102 PS 1-3</td><td>K-103 PS 1-4</td></tr>
<tr><td>16:30<br>–<br>16:50</td><td colspan="13">COFFEE BREAK</td></tr>
<tr><td></td><td colspan="6">Blue Amphi</td><td colspan="7">Red Amphi</td></tr>
<tr><td></td><td colspan="6">Chair: Dragan DJORDJEVIC</td><td colspan="7">Chair: Raoul NIGMATULLIN</td></tr>
<tr><td>16:50<br>–<br>17:25</td><td colspan="6">Janusz BRZDEK -<br>Fixed Point Results Motivated by Ulam Stability</td><td colspan="7">Dumitru BALEANU -<br>Fractional Calculus and Non-Locality</td></tr>
<tr><td>17:25<br>–<br>19:25</td><td>Blue Amphi SPS 1-2</td><td>Red Amphi SPS 4-1</td><td>Amphi 2 PS 1-5</td><td>Amphi 3 PS 1-6</td><td>Amphi 4 PS 2-3</td><td>Amphi 5 PS 3-4</td><td>Amphi 6 PS 3-5</td><td>L-111 PS 1-7</td><td>L-112 PS 1-8</td><td>K-101 PS 2-4</td><td>K-102 SPS 6-1</td><td colspan="2"></td></tr>
<tr><td>19:30<br>–<br>20:45</td><td colspan="13">WELCOME RECEPTION (CENTRAL CAMPUS)</td></tr>
</table>

| 28 April Friday, 2017 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **08:00 – 09:00** | **Registration - BALGAT CAMPUS** | | | | | | | | | |
| **09:00 – 09:50** | **Red Amphi - Chair: Albert LUO**<br>**Plenary Speaker: Yangjian CAI**<br>**Title:** Partially Coherent Beam with Prescribed Beam Properties | | | | | | | | | |
| **09:50 – 10:25** | **Red Amphi - Chair: Erdal KARAPINAR**<br>**Plenary Speaker: Dragan S. DJORDJEVIC**<br>**Title:** Geometric Operator Theory: Fredholm Theory and Projections | | | | | | | | | |
| **10:20 – 11:00** | **Red Amphi - Chair: Kenan TAS**<br>**Invited Speaker: Shahram REZAPOUR**<br>**Title:** On a System of Fractional Finite Difference Inclusions | | | | | | | | | |
| **11:00 – 11:20** | **COFFEE BREAK** | | | | | | | | | |
| **11:20 – 11:55** | **Red Amphi - Chair: J. A. Tenreiro MACHADO**<br>**Invited Speaker: Carla PINTO**<br>**Title:** The Burden of The HIV Viral Load on the Natural Progression of HCV in a Coinfection Model | | | | | **Blue Amphi - Chair: Giuseppe MARINO**<br>**Invited Speaker: Erdal KARAPINAR**<br>**Title:** Fixed Points of Certain Mappings in the Context of Brianciari Metric Space | | | | |
| **11:55 – 12:30** | **Red Amphi - Chair: Dumitru BALEANU**<br>**Invited Speaker: Raoul NIGMATULLIN**<br>**Title:** New Solutions of the Functional Equations and Their Possible Application in Treatment of Complex Systems | | | | | | | | | |
| **12:35 – 13:00** | **DEPARTURE TO THE CENTRAL CAMPUS** | | | | | | | | | |
| **13:00 – 14:30** | **LUNCH (CENTRAL CAMPUS)** | | | | | | | | | |
| **14:30 – 16:30** | **Blue Amphi SPS 6-2** | **Red Amphi SPS 4-2** | **Amphi 2 SPS 7-1** | **Amphi 3 SPS 1-3** | **Amphi 4 SPS 4-3** | **Amphi 5 SPS 5** | **Amphi 6 PS 1-9** | **L-111 PS 2-5** | **L-112 PS 3-6** | |
| **16:30 – 16:50** | **COFFEE BREAK – POSTER SESSION** | | | | | | | | | |
| **16:50 – 18:30** | **Blue Amphi PS 2-6** | **Red Amphi SPS 4-4** | **Amphi 2 PS 3-7** | **Amphi 3 SPS 7-2** | **Amphi 4 PS 1-10** | **Amphi 5 SPS 6-3** | **Amphi 6 SPS 4-5** | **L-111 PS 3-8** | | |
| | **Blue Hall** | | **Red Hall** | | **Amphi 2** | | **Amphi 3** | | **Amphi 4** | |
| | **Chair: Janusz BRZDEK** | | **Chair: Thabet ABDELJAWAD** | | **Chair: Alireza Khalili GOLMANKALEH** | | **Chair: Kenan TAS** | | **Chair: Carla PINTO** | |
| **18:30 - 19:05** | **Invited Speaker: Giuseppe MARINO** - Midpoint Rule for Quasi-Nonexpansive Mappings | | **Invited Speaker: Hossein JAFARI** - B-Spline Functions: A Tools for Solving of Fractional Partial Differential Equations | | **Invited Speaker: Abdon ATANGANA** - Modelling Groundwater Fractal Flow with Fractional Differentiation via Mittag-Leffler Law | | **Invited Speaker: Fethi Bin Muhammad BELGACEM** - Was an Extra Sumudu "s" too Cumbersome for Laplace? | | **Invited Speaker: Grzegorz LITAK** - Vibrational Energy Harvesting in Bistable Systems and Structures | |
| **19:10 - 21:30** | **BANQUET DINNER (CENTRAL CAMPUS)** | | | | | | | | | |

| CENTRAL CAMPUS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 April Saturday, 2017 | | | | | | | | | | | |
| 09:00 – 10:40 | Blue Amphi PS 1-11 | Red Amphi PS 2-7 | Amphi 2 PS 3-9 | Amphi 3 SPS 4-6 | Amphi 4 PS 4-2 | Amphi 5 SPS 4-7 | Amphi 6 PS 3-10 | L-111 SPS 1-4 | L-112 SPS 7-3 | K-101 SPS 6-4 | |
| 10:40 – 11:00 | COFFEE BREAK | | | | | | | | | | |
| 11:00 – 13:00 | Blue Amphi PS 1-12 | Red Amphi PS 3-11 | Amphi 2 SPS 6-5 | Amphi 3 PS 1-13 | Amphi 4 PS 1-14 | Amphi 5 SPS 1-5 | Amphi 6 PS 3-12 | L-111 SPS 7-3 | L-112 SPS 4-8 | K-101 SPS 4-9 | |
| 13:00 – 13:30 | CLOSING CEREMONY | | | | | | | | | | |
| 13:30 – 14:30 | LUNCH (RECTORATE BUILDING OPEN GARDEN - CENTRAL CAMPUS) | | | | | | | | | | |
| 14:30 – 17:30 | ANKARA TOUR | | | | | | | | | | |

**PS: Parallel Session**

**SPS: Special Session**

# 27 April Thursday, 2017

| | **Blue Hall<br>Special Session 1-1** | **Red Hall<br>Special Session 2** | **Auditorium 2<br>Special Session 3** | **Auditorium 3<br>Parallel Session 1-1<br>Mathematical Tools** |
|---|---|---|---|---|
| | **Chair: Erdal KARAPINAR<br>Co-Chair: Umit AKIN AKSOY** | **Chair: Carla PINTO<br>Co-Chair: Isabel Roxana BIRS** | **Chair: Yangjian CAI<br>Co-Chair: Quanying WU** | **Chair: Muhammad Aslam NOOR<br>Co-Chair: Yusuf PANDIR** |
| **14:30<br>-<br>14:50** | **Luigi MUGLIA** -<br>Approximations on Non-self Monotone Operators | **Konrad MARKOWSKI** –<br>Fractional Quasi-Positive Realisation of SISO Fractional Discrete-Time Systems | **Quanying WU** -<br>Research on the Complicated Aperture Imaging System | **Cuneyt CEVIK - Sehla EMINOGLU** -<br>Fuzzy Vector Metric Spaces and Some Results |
| **14:50<br>-<br>15:10** | **Bruno SCARMAGALIA** -<br>On Modified Mann's Method to Approximate Strongly Fixed Points of Strict Pseudo-Contractive Mappings | **Carla PINTO** -<br>Fractional Dynamics of a HIV Infection Model with Time-Varying Drug<br>Exposure | **Lin LIU** -<br>Decomposition of a Hermite-Gaussian Correlated Schell-Model Beam | **Muhammad Aslam NOOR** -<br>Dynamical Systems Techniques for Variational Inequalities |
| **15:10<br>-<br>15:30** | **Marija CVETKOVIC** -<br>On the Ulam's Stability of Functional Equations via Perov Type Fixed Point Theorems | **Nusret TAN** -<br>Examining of Numerical Methods in Time Response Analysis of Fractional Order Systems with Long Settling Time | **Omer KASAR** -<br>A 5.8 Ghz Ism Bant Microstrip Patch Antenna Design and Its Impedance Matching with Euler Method | **Deniz Pınar SUNAOGLU** -<br>On Fuzzy Normed Spaces Category |
| **15:30<br>-<br>15:50** | **Alberto SIMOES** -<br>Hyers-Ulam and Hyers-Ulam-Rassias Stability for a Class of Integro-Differential Equations | **Konrad MARKOWSKI** -Classes of Digraphs Structures with Weights Corresponding to One-Dimensional Fractional Systems | **Chunhao LIANG** -<br>Producing Intensity and Degree of Coherence Lattices with Complex Optical System | **Duygu ICEN - Sevil BACANLI** -<br>Fuzzy Hypothesis Testing for Inverse Gaussian Mean When Scale Parameter is Unknown |
| **15:50<br>-<br>16:10** | **Naeem SALEEM** -<br>Best Proximity Point Results in Fuzzy Metric Spaces | **Eva Henrietta DULF** -<br>Fault Tolerant Control of the 13C Isotope Separation Cascade | **Omer KASAR** -<br>A New Multi Stepped Real Impedance Matching Method with Euler Polynomials and Its Application on Transmission Line | **Tahir CEYLAN** -<br>Fuzzy Sturm-Liouville Problem |
| **16:10<br>-<br>16:30** | **Kelly OSAWARU** -<br>On Fuzzy Soft Mappings and Fixed Point Theorems | **Isabel Roxana BIRS** -<br>An Autotuning Method for a Fractional Order PD Controller for Vibration Suppression | | **Yusuf PANDIR** -<br>New Type of F-Expansion Method and Its Application |

| | **Auditorium 4**<br>**Parallel Session 2-1**<br>**Numerical Methods** | **Auditorium 5**<br>**Parallel Session 3-1**<br>**Mathematical Modelling** | **Auditorium 6**<br>**Parallel Session 2-2**<br>**Numerical Methods** | **L-111**<br>**Parallel Session 3-2**<br>**Mathematical Modelling** |
|---|---|---|---|---|
| | **Chair: Mohamed Yusuf HASSAN**<br>**Co-Chair: Esra KARAOGLU** | **Chair: Ali ALLAHVERDI**<br>**Co-Chair: Akindele Michael OKEDOYE** | **Chair: Idris DAG**<br>**Co-Chair: Hatice ASLAN** | **Chair: Hasan Cenk YELKENCI**<br>**Co-Chair: Abdullah ALGIN** |
| **14:30 - 14:50** | **Mohamed Yusuf HASSAN** - Design and Implementation of A General Interpreter for Automatic Generation and Step-by-Step Solving of Non-Linear System of Equations Using Symbolic Approaches | **Vilda PURUTCUOGLU** - Modelling of Biochemical Networks via Classification and Regression Tree Methods | **Murat Emre ERKOC** - Comparison of l1 Minimization and Greedy Algorithms for Recovering Sparse Frequency-Domain Signals | **Mohammad Saleh FARHAM** - Connected Maximal Covering Location Problem in the Continuous Plane |
| **14:50 - 15:10** | **Mujdat KAYA** - A Numerical Method for Solving a Boundary Value Problem for a Class of Interval Differential Equations | **Ayca Hatice TURKAN** - A Mixture Model of Two Bivariate Weibull Distributions: An Application Study | **Halil MUTUK** - Runge-Kutta Approach to Quantum Harmonic Oscillator | **Gulden MULAYIM** - Reduce Order Modeling for Reaction-Diffusion Equations with Cross Diffusion |
| **15:10 - 15:30** | **Esra KARAOGLU** - Hopf Bifurcation Analysis of Coupled Two-Neuron System with Discrete and Distributed Delays | **Ali ALLAHVERDI** - No-Wait Flowshop Scheduling Problem with Both Makespan and Mean Completion Times | **Hatice ASLAN** - A Continuous Analogue of the Bernstein Polynomials | **Hasan Cenk YELKENCI** - A Constraint Programming Model for the Flow Shop Scheduling Problem |
| **15:30 - 15:50** | **Emrullah YASAR** - On The Solutions and Conservation Laws of (2+1)-Dimensional Breaking Soliton Equation | **Akindele Michael OKEDOYE** - Heat Transfer in Hydro Magnetic Oscillatory Flow Past an Impulsively Started Porous Limiting Surface | **Merve GURBUZ** - Numerical Stability of RBF Solution for Unsteady Full MHD Flow Equations | **Hatice GIDEMEN** - On f-Statistical Convergence of Generalized Difference Sequences |
| **15:50 - 16:10** | **Zeynep KALKAN** - Iterative Solutions of Nonlinear Volterra Integral Equations with Delay | **Beyda TASAR** - Dynamic Analysis of Five Finger 15 DoF Hand | **Mehmet Ali MERSIN** - Solving Modified Equal Width Equation Using Cubic B-spline Quasi-Interpolation | **Mehmet EKER** - Forced Vibration Analysis of Non-uniform Piezoelectric Rod by Pseudospectral Chebyshev Method |
| **16:10 - 16:30** | **Ozlem ERSOY HEPSON** - A Quartic Trigonometric B-spline Collocation Method for Solving the Kuramoto-Sivashinsky Equation | **Buket AY** - Quartic B-spline Galerkin Method for the Advection Diffusion Equation | **Yusuf SEBER** - A Quintic Trigonometric B-spline Collocation Method for Solving the Kuramoto-Sivashinsky Equation | **Gurkan KAVURAN** - Numerical Modelling of Inaccessible Subsystem Dynamics: An Application for Control Engineering Practices |

| | L-112<br>Parallel Session 3-3<br>Mathematical Modelling | L-113<br>Parallel Session 4-1<br>Signal Processing | K-101<br>Parallel Session 1-2<br>Mathematical Tools | K-102<br>Parallel Session 1-3<br>Mathematical Tools | K-103<br>Parallel Session 1-4<br>Mathematical Tools |
|---|---|---|---|---|---|
| | **Chair: Mir Sajjad HASHEMI**<br>**Co-Chair: Yasemin POLAT** | **Chair: A. Hakan AKTAS**<br>**Co-Chair: Ahmad JAFARIAN** | **Chair: Maypeyker OZTURK**<br>**Co-Chair: Mahmoud ALREFAEI** | **Chair: Mustafa ASLANTAS**<br>**Co-Chair: Ovgu GUREL YILMAZ** | **Chair: Seyda SEZGEK**<br>**Co-Chair: Tugba YURDAKADIM** |
| **14:30 - 14:50** | **Sebnem DEMIRKOL AKYOL** - A Computational Approach for Ergonomic Assembly Line Balancing | **Ahmad JAFARIAN** - The Effect of Smile on Facial Attractiveness by Artifitioal Intelegence | **Hifsi ALTINOK** - Lacunary Statistical Boundedness of Order β of Sequences of Fuzzy Numbers | **Mustafa OZKAN** - Construction of Hadamard Codes with Rings | **Tugba YURDAKADIM** - Variational Approximation for Modified Meyer-Konig and Zeller Operators |
| **14:50 - 15:10** | **Yasemin POLAT** - Identification of Customer Preference for Olive Oil by Using Discrete Choice Method | **A. Hakan AKTAS** - Spectrometric Multi Component Determination of Vanillin, Maltol and Ethyl Maltol in Candy Foods Artificial Neural Network Calibration | **Huseyin CAKALLI** - A Study on Statistical Quasi Cauchy Sequences | **Mustafa ASLANTAS** - A Frobenius Gelfand-Mazur Type Theorem on b-algebras | **Seyda SEZGEK** - Double Wedge and Weakly Double Wedge FDK-Spaces |
| **15:10 - 15:30** | **Yasin ILHAN** - Determination of T2 * Value in Thalassemia Patients by Artificial Bee Colony Algorithm | **Bahadır YUZBASI** - Pretest and Stein-Type Estimations in Quantile Regression Model | **Mahmoud ALREFAEI** - Fully Fuzzy Linear Programming | **Ovgu GUREL YILMAZ** - On Szasz-Mirakyan Type Operators Preserving Polynomials | **Turgay UYSAL** - Blow Up of Solutions for a System of Nonlinear Higher-Order Kirchhoff-Type Equations with Nonlinear Damping |
| **15:30 - 15:50** | **Yasin ASAR** - Linear Unified Shrinkage Estimators in Linear Models | **Ahmad JAFARIAN** - A New Hybrid Algorithm for Solving Engineering Problem and Data Clustering | **Manal Mastafa Abdsallm ALMESBAHI** - On the q-Bernstein Operators | **Ozlem OKSUZER YILIK** - Convergence of the Durrmeyer-Type Operators in Variation Seminorm | **Umut ESEN** - An Alternating Alternative Sum Over Semigroups |
| **15:50 - 16:10** | **Cagri SEL** - A Hybrid Mixed Integer Linear Programming and Constraint Programming Model for the Planning and Scheduling Problem in the Dairy Industry | **J. A. Tenreiro MACHADO**- Mathematical Model for Atrial Electrical Propagation Based on Complex-Order Spatial Derivatives | **Maya ALTINOK** - Strongly Porous Subsets of N at Infinity | **Mustapha Fateh YAROU** – Invariant Systems with Dissipative Set-Valued Maps | **Umit YILDIRIM** - Pseudo Projective Curvature Tensor Satisfying Some Properties on a Normal Paracontact Metric Manifold |
| **16:10 - 16:30** | **Sebnem DEMIRKOL AKYOL** - A Meta-Heuristic Approach for Evaluating Ergo-nomic Risk Factors of a Real Life Assembly Line Worker Assignment and Balancing Problem | **Tugba KUCUKSEYHAN**- Model Order Reduction for Pattern Formation of FitzHugh-Nagumo Equation | **Ayse BUGATEKIN** - On Moments of Sample Extremes of Order Statistics from Discrete Uniform Distribution | **Tolga AKTURK** - An Application of the New Function Method to the Coupled Sine-Gordon Equation | **Serkan ASLIYUCE** - Chebyshev's Inequaliy with Fractional Summation Operator |

| | Blue Hall<br>Special Session 1-2 | Red Hall<br>Special Session 4-1 | Auditorium 2<br>Parallel Session 1-5<br>Mathematical Tools | Auditorium 3<br>Parallel Session 1-6<br>Mathematical Tools |
|---|---|---|---|---|
| | **Chair: Alberto SIMOES**<br>**Co-Chair: Selma GULYAZ OZTURK** | **Chair: Dumitru BALEANU**<br>**Co-Chair: Guo-Cheng WU** | **Chair: Ayse BUGATEKIN**<br>**Co-Chair: Sinan ERCAN** | **Chair: Gokhan GOKDERE**<br>**Co-Chair: Ahu ERCAN** |
| **17:25 - 17:45** | **Inci ERHAN** - Geraghty type contractions on Branciari b-metric spaces | **Guo-Cheng WU** - Discrete Time Control for Fractional Systems–Lyapunov Direct Method | **Mehmet ATCEKEN** - On the Quasi Conformal Curvature Tensor of a Normal Paracontact Metric Manifold | **Ahmet OTELES** - On The Inverse and The Powers of One Type of Skew Circulant Matrices |
| **17:45 - 18:05** | **Veysel NEZIR** - $c_0$ Can Be Renormed to Have The Fixed Point Property for Affine Nonexpansive Mappings | **Alireza Khalili GOLMANKALEH** - Differential Equations On The Fractal Tartan | **Muhammad Aslam NOOR** - Auxiliary Principle Technique for Strongly Mixed Variational-like Inequalities | **Ahu ERCAN** - Inverse Nodal Problem for Discontinuous Integro-Differential Operator |
| **18:05 - 18:25** | **Ozgur EGE** - Fixed Point of Various Contraction Conditions in Digital Metric Spaces | **Xiaoting LIU** - A Variable-Order Fractal Derivative Model for Anomalous Diffusion | **Murat BODUR** - A Generalization of Lupaş-Jain Operators | **Suleyman DIRIK** - Contact Pseudo-Slant Submanifolds of a LPSasakian Manifold |
| **18:25 - 18:45** | **Tugce ALYILDIZ** - Fixed Point Results For F-Contractions On Space With Two Metrics | **Shahram REZAPOUR** - On Dimension of The Set of Solutions for a Fractional Differential Inclusion | **Sinan ERCAN** - On Weak λ-statistically Convergence of Order α | **Gokhan GOKDERE** - Repairable Circular Consecutive-2-out-of-n: F System with Unequal Constant Failure Rates |
| **18:45 - 19:05** | **Ozgur EGE** - Fixed Point Theorem for Commuting Mappings in Digital Metric Spaces | **Omer ACAN** - On the Solutions of Systems of Differential Equations with Conformable Derivative | **Ayse BUGATEKIN** - Reliability of Consecutive k-out-of-n Systems with Non-Homogeneous Poisson Process | **Altaf Ahmad BHAT** – Dirichlet Averages of Wright-Type Hypergeometric Functıon and Their Q-Extension |
| **19:05 - 19:25** | | **Mehmet Giyas SAKAR** - Numerical Solution of Fractional Bratu Type Equation by Legendre-Reproducing Kernel Method | **Fatma AYAZ** - A Numerical Approach For Solving Multi Term Fractional Order Differential Equations | **Ahu ERCAN** - Certain Stability Singular Sturm-Liouville Operator |

| | **Auditorium 4**<br>**Parallel Session 2-3**<br>**Numerical Methods** | **Auditorium 5**<br>**Parallel Session 3-4**<br>**Mathematical Modelling** | **Auditorium 6**<br>**Parallel Session 3-5**<br>**Mathematical Modelling** | **L-111**<br>**Parallel Session 1-7**<br>**Mathematical Tools** |
|---|---|---|---|---|
| | **Chair: Mehmet Onur FEN**<br>**Co-Chair: Esra KARATAS** | **Chair: Ozlem ORHAN**<br>**Co-Chair: Mustafa SENAY** | **Chair: Emre TAS**<br>**Co-Chair: Mirac KAYHAN** | **Chair: Ezgi TURKARSLAN**<br>**Co-Chair: Enes YAVUZ** |
| **17:25 - 17:45** | **Esra KARATAS** - A Numerical Investigation on Burgers Equation by MOL-GPS Method | **Mustafa SENAY** - High Temperature Thermostatistical Properties of The VPJC-Type q-fermion Gas Model in Two Dimensions | **Derya KARAGOZ** - The Modified Range Charts for Monitoring The Contaminated Process | **Diyar Omar Mustafa ZANGANA** - Jacobsthal Numbers and Associated Bipartite Graphs |
| **17:45 - 18:05** | **Mehmet Onur FEN** - Almost Periodicity in Chaos | **Ozlem ORHAN** - Application of Symmetry Approach of The Heat Transfer Equation | **Emre TAS** - Korovkin Theory for Extraordinary Test Functions by A-Statistical Convergence | **Durhasan Turgut TOLLU** - On a Solvable Nonlinear Difference Equation of Higher Order |
| **18:05 - 18:25** | **Emrullah YASAR** - Application of Multiple Exp-Function Method to Nonlinear Evolution Equations | **Amin FARIDYAHYAEI** - A Multi-level Continuous Minimax Location Problem with Regional Demand | **Gokcen OZDEMIR** - Design of M-Channel Uniform Cosine Modulated Filter Bank Using qABC Algorithm | **Enes YAVUZ** - Tauberian Theorems for Lambert and Zeta Summability Methods in Fuzzy Number Space |
| **18:25 - 18:45** | **Ozlem ERSOY HEPSON** - Finite Element Method for Schnackenberg Model | **Hacene Chaouche SOUMEYA** - Formulation Variational for Electro-Elastic Problem with Friction | **Umran ISIK** - Evaluation of Obstructive Sleep Apnea from Polysomnography Signals with Wavelet Transform | **Ezgi TURKARSLAN** - A Theoretical Approach for Identification of A Fuzzy Measure That is Subadditive Over Singletons |
| **18:45 - 19:05** | **Aysegul CAYIR AYDAR** - A Numerical Solution of the RLW Equation by Least Squares Method | **Abba AUWALU** - Strong Convergence of an Iterative Process for a Family of Strictly Pseudocontractive Mappings in q-uniformly Smooth Banach Space | **Boudjedour ALLAOUA** - Electro-Viscoelastic Antiplan Contact Problem with Regularized Friction Law | **Abdullah AHMETOGLU** – The Best Constant of Lyapunov-Type Inequality for Fourth-Order Linear Differential Equations with Anti-Periodic Boundary Conditions |
| **19:05 - 19:25** | **Fatma TOKMAK FEN** - Chaotic Dynamics of SICNNs on A Time Scale | **Konrad MARKOWSKI** – Method for Finding a Set of (A,B,C,D) Realisations for Fractional-Order SIMO and MISO 1-D Dynamic Systems | | **Enes YAVUZ** - On The Statistical Weighted Mean Summability of Slowly Decreasing Sequences of Fuzzy Numbers |

| | L-112<br>Parallel Session 1-8<br>Mathematical Tools | K-101<br>Parallel Session 2-4<br>Numerical Methods | K-102<br>Special Session 6-1 |
|---|---|---|---|
| | **Chair: Gamze TANOGLU**<br>**Co-Chair: Sezer ERDEM** | **Chair: Ahmad JAFARIAN**<br>**Co-Chair: Idris DAG** | **Chair: Elgiz BAIRAMOV**<br>**Co-Chair: Yelda AYGAR** |
| **17:25**<br>**-**<br>**17:45** | **Figen OKE** -<br>Linear Codes over Non-chain Ring | **Idris DAG** -<br>A Comparative Numerical Study Based on Cubic Polynomial and Trigonometric B-splines for the Gardner Equation | **Abdumalik RAKHIMOV** –<br>Localization Of The Spectral Expansions Associated With The Partial Differential Operators |
| **17:45**<br>**-**<br>**18:05** | **Gamze TANOGLU** -<br>Frechet Derivative Based Linearization Method for Burgers-Type Equations | **Sebnem YILDIZ** -<br>A Matrix Application of Convex Sequences to Fourier Series | **Ekin UGURLU** -<br>Bessel-Type Dissipative Operators With Transmission Conditions |
| **18:05**<br>**-**<br>**18:25** | **Guner OZTURK** -<br>Miscellaneous Properties of A Family of Orthogonal Polynomials in Two Variables | **Halil MUTUK** -<br>Runge-Kutta Method for Coulomb Potential in Schrödinger Equation | **Turhan KOPRUBASI** –<br>Principal Functions of Discrete Dirac Equations with Quadratic Eigenparameter in Boundary Condition |
| **18:25**<br>**-**<br>**18:45** | **Sezer ERDEM** -<br>On the Block Sequence Space $\ell_p(E, B(r,s))$ and Related Matrix Transformations | **Ahmad JAFARIAN** -<br>A New Method for Solving Two-Dimensional Bratu Differential Equation | **Ekin UGURLU** -<br>On The Dissipative Extension Of A Direct-Sum Differential Operator |
| **18:45**<br>**-**<br>**19:05** | **Huseyin KAPLAN** -<br>A Study on Strong Lacunary Quasi-Cauchy Sequences | **Sıla Ovgu KORKUT UYSAL** -<br>A Linearization Method to Benjamin-Bona-Mahony Equations: Analysis and Applications | **Pembe IPEK** -<br>The General Form of Maximally Accretive Quasi-Differential Operators for First Order |
| **19:05**<br>**-**<br>**19:25** | **Abdelhamid REHOUMA** -<br>Polar Orthogonal Polynomials and Applications | **Gokhan GOK** -<br>A Numerical Method for Calculation of Ionosonde Virtual Height | **Elgiz BAIRAMOV** -<br>Spectral Analysis of The Quadratic Pencil Of Schrödinger Equation With A General Boundary Condition |

# 28 April Friday, 2017

| | Blue Hall<br>Special Session 6-2 | Red Hall<br>Special Session 4-2 | Auditorium 2<br>Special Session 7-1 | Auditorium 3<br>Special Session 1-3 |
|---|---|---|---|---|
| | **Chair: Oktay Sh. MUKHTAROV**<br>**Co-Chair: Kadriye AYDEMIR** | **Chair: Grzegorz LITAK**<br>**Co-Chair: Alireza Khalili GOLMANKALEH** | **Chair: Ozlem DEFTERLI**<br>**Co-Chair: Ayse OZMEN** | **Chair: Luigi MUGLIA**<br>**Co-Chair: Marija CVETKOVIC** |
| **14:30 - 14:50** | **Oktay Sh. MUKHTAROV**- The Eigenvalue Problem with Interaction Conditions at One Interior Singular Point | **Grzegorz LITAK** - Multiscale Characterization and Model For The Dynamic Behavior Of Ferroelectric Materials Using Fractional Operators | **Melih AGRAZ** - Empirical Copula in The Detection of Batch Effects | **Farshid KHOJASTEH** - Application of Manageable and Strong Manageable Functions in The Set of Multi-Valued Mappings |
| **14:50 - 15:10** | **Hayati OLGAR** - Some Properties of Weak Eigenfunctions for one Sturm-Liouville Problem | **Mohammed AL-REFAI** - Analysis of The Fractional Diffusion Equations with Fractional Derivative of Non-Singular Kernel | **Gamze NALCACI** - Long-Term Load Forecasting - Comparison of Models Based on MARS, ANN and SVR Methods | **Selma GULYAZ OZYURT** - On Some Fixed Point Theorems on Brianciari b-metric Spaces |
| **15:10 - 15:30** | **Kadriye AYDEMIR** - A Note on Discontinuous Sturm-Liouville Problems with Interface Conditions | **Tugba AKMAN** – The Effect of Obesity on Fractional Cancer Tumor Growth Model | **Ezgi AYYILDIZ** - Modelling of Various Biological Networks via LCMARS | **Umit AKSOY** - Existence and Uniqueness of Fixed Points of Maps Satisfying C-condition in Modular Metric Spaces |
| **15:30 - 15:50** | **Hayati OLGAR** - Hilbert Space Formulation And Green Function of One Discontinuous Boundary Value Problem | **Ghania REBIAI** - The Non Existence Of Positive Solutions For Nonlinear Fractional Systems | **Kemal SUBULAN** - A New Intermodal Fleet Planning Model Via Hybrid Fuzzy-Stochastic Mathematical Programming Method | **Veysel NEZIR** - Recent Developments in Renorming $c_0$ and Fixed Point Property for Affine Nonexpansive Mappings |
| **15:50 - 16:10** | **Ekin UGURLU** - On Dissipative Fractional Operators | **Aissani KHALIDA** - Fractional Integro-Differential Inclusions with State-Dependent Delay | **Betul KALAYCI** - Identification of Systems of Stochastic Differential Equations for Generalized Model Classes in Financial Mathematics Including Investor Sentiment | **Nurcan BILGILI GUNGOR** - Remarks on Soft G-Metric Spaces and Fixed Point Theorems |
| **16:10 - 16:30** | **Gokhan MUTLU** - Spectral Properties of Non-selfadjoint Sturm-Liouville Operator with Operator Coefficient | **Mehmet Giyas SAKAR** - A New Technique for Numerical Solution of Fractional BVP's | **Mohammed MAIZA** - Classification of Microarray Data Using Fly Algorithm | |

| | Auditorium 4<br>Special Session 4-3 | Auditorium 5<br>Special Session 5 | Auditorium 6<br>Parallel Session 1-9<br>Mathematical Tools | L-111<br>Parallel Session 2-5<br>Numerical Methods | L-112<br>Parallel Session 3-6<br>Mathematical Modelling |
|---|---|---|---|---|---|
| | **Chair: Fahd JARAD**<br>**Co-Chair: Sharifa AL-SHARIF** | **Chair: Mustafa INC**<br>**Co-Chair: Ali AKGUL** | **Chair: Abdullah ALGIN**<br>**Co-Chair: Erdal BAS** | **Chair: Ahmet Sinan CEVIK**<br>**Co-Chair: Pınar KESKIN** | **Chair: Ozlem TURKSEN**<br>**Co-Chair: Ilker GOKTEPELI** |
| **14:30 - 14:50** | **Sharifa AL-SHARIF** - New Generalization of Conformable Fractional Derivative with Classical Properties | **Ali AKGUL** - Solutions of Initial Value Problems by Reproducing Kernel Method and Group Preserving Scheme | **Ramazan OZARSLAN** - The Diffusion Difference Equation | **Asif YOKUS**- On the Numerical Solutions of Finite Difference Method to the Cahn-Allen Equation | **Eren DEMIR** - Prediction of Scattering Parameter Characteristics of a Microwave Transistor Using Artificial Neural Networks |
| **14:50 - 15:10** | **Thabet ABDELJAWAD** - A Generalized Lyaponuv Inequality in the Frame of Conformable Derivatives | **Mir Sajjad HASHEMI** - Analytical Investigation on The Fractional Diffusion-Absorption Equation | **Abdullah ALGIN** - A Deformed Fermion Oscillator Model: Algebra, Fermionic Q-Calculus and Thermostatistics | **Cemre AYDIN** - DRBEM Solution of the Cauchy Problem for MHD Rectangular Duct Flow | **Ozlem TURKSEN** - A Proper Method for Fuzzy Parameter Estimation of Linear Model with Replicated Response Measures |
| **15:10 - 15:30** | **Meryeme ELHARRAK** - A Generalization of Darbo's Fixed Point Theorem and Application to Nonlocal Fractional Differential Equation | **Ali AKGUL** - Solutions of Nonlinear Differential Equations by Reproducing Kernel Method And Group Preserving Scheme | **Erdal BAS** - Analysis of Sturm-Liouville Difference Equation Via Delta Calculus | **Fatma AYDOGMUS** - A Numerical Study on the 2D Nonlinear Fermionic Model | **Isiltan SAYIN** - Generalization of Fresnel Integral Computation by Fractional Fourier Transform for Electromagnetic Vector Fields |
| **15:30 - 15:50** | **Fuat USTA** - Some Hermite-Hadamard and Ostrowski Type Inequalities for Fractional Integral Operators with Exponential Kernel | **Rabar Mohammed RASUL** - Tan (F(ζ)/2) - Expansion Method for Exact Solutions of The (2+1)-Dimensional Potential Kdv Equation | **Rashid ABU-DAWWAS** – Almost First Strongly Graded Rings | **Engin TAS** - Egg's Grade Classification using an Online Pairwise Support Vector Machine | **Ozlem TURKSEN** - Inferences on Fuzzy Linear Model Parameter Estimates by Using Bootstrap Method for Replicated Response Measures |
| **15:50 - 16:10** | **Guezane-Lakoud ASSIA** – Existence of Solutions for a Nonlinear Higher Order Fractional Differential Equation | **Melike AYDOGAN** - Two High-Order Fractional Differential Equations By Using The Caputo-Fabrizio Derivative | **Kemal Gurkan TOKER** - Hyperspectral Unmixing via Convolutional Neural Network | **Pinar KESKIN** - Numerical Solution of Modified Regularized Long Wave Equation | **Ismail YENILMEZ** - Estimation Based on Generalized Logistic Distribution for the Censored Regression Model |
| **16:10 - 16:30** | **Adel AGILA** - The Application of Variable-order Caputo Fractional Derivative to Obtain the Response of a Fractional Damped Oscillatory System | **Onur SALDIR** - An Iterative Reproducing Kernel Method for Time and Space Fractional Burgers Equation | **Hatice Nedret OZGEN** - On Two Integrability Methods of Improper Integrals | **Engin TAS** - A Fast Gradient Descent Method for Learning to Rank | **Ilker GOKTEPELI** - Evaluation of Turbulence Models for Heat Transfer in Horizontal Parallel Plates |

| | Blue Hall<br>Parallel Session 2-6<br>Numerical Methods | Red Hall<br>Special Session 4-4 | Auditorium 2<br>Parallel Session 3-7<br>Mathematical Modelling | Auditorium 3<br>Special Session 7-2 |
|---|---|---|---|---|
| | **Chair: Ayse SARIAYDIN FILIBELIOGLU**<br>**Co-Chair: Meguellati FAROUK** | **Chair: Hossein JAFARI**<br>**Co-Chair: Raoul NIGMATULLIN** | **Chair: Kemal SUBULAN**<br>**Co-Chair: Sina RAZVARZ** | **Chair: Gerhard-Wilhelm WEBER**<br>**Co-Chair: Pakize TAYLAN** |
| **16:50 - 17:10** | **Feza ARIKAN** - Dynamo Equation Solution Using Finite Volume Method For Midlatitude Ionosphere | **Thabet ABDELJAWAD** - Fractional Operators with Nonsingular Kernels of order $\alpha > 1$ and Lyaponuv Type Inequalities | **Aouachria ZEROUAL** - Mathematical Modelling and Experimental Study of Aerodynamic Operation of The Savonius Rotor | **Gerhard-Wilhelm WEBER** - Optimal Control Under Stochastic, Impulsive, Reggime Switching and Paradigm Shifting Environments in Economics and Finance |
| **17:10 - 17:30** | **Anoune MOUSSA** - Accelerating Numerical Computations in Slow Iterative Loops Using The Secant Method | **Fahd JARAD** - Generalized Fractional Derivatives and The $\rho$-Laplace Transform | **Sina RAZVARZ** - The Effect of Baffles on Heat Transfer Enhancement | **Pakize TAYLAN** - A Comparative Study on Classification by Nonparametric Regression |
| **17:30 - 17:50** | **Ayse SARIAYDIN FILIBELIOGLU**- Discontinuous Galerkin Finite Elements Method For Allen-Cahn&Cahn-Hilliard Equations with Degenerate Mobility | **Muhammad MUSTAFA** - Energy Decay in A Quasilinear System with Finite And Infinite Memories | **Souida BOUKRIOUA** - Bilateral Contact Problem with Adhesion Between Two Bodies for Viscoelastic with Long-Term Memory and Damage | **Ayse OZMEN** - A Review of R(C)MARS and (C)MARS with A Comparison Study |
| **17:50 - 18:10** | **Meguellati FAROUK** - Numerical Simulation of New Modified VAWT | **Abdelkader SAADI** - Stability of Fractional Order Systems with Riemann-Liouville Derivatives | **Basak GEVER** - Non-Stationary Distribution of Semi-Markovian Random Walk with a Generalized Reflecting Barrier | **Ozlem DEFTERLI** - A Real-World Application for Genetic Regulatory Networks via Spline Regression Model |
| **18:10 - 18:30** | **Seyma KAYAN** - An Algorithm for Hopf Bifurcation Analysis of A Delayed Reaction-Diffusion Model | **Xiao-Jun YANG** - A New Integral Transform with Applications to Maxwell and Voigt – Kelvin Elements Involving Fractional Derivatives of Caputo and Riemann-Liouville Types | **Ahmad JAFARIAN** - A modified and Enhanced Ant Colony Optimization-Algorithm for Traveling Salesman Problem | **Ece KOKSAL** - Modeling of Exchange Rates by Multivariate Adaptive Regression Splines and Comparison with Classical Statistical Methods |

| | **Auditorium 4**<br>**Parallel Session 1-10**<br>**Mathematical Tools** | **Auditorium 5**<br>**Special Session 6-3** | **Auditorium 6**<br>**Special Session 4-5** | **L-111**<br>**Parallel Session 3-8**<br>**Mathematical Modelling** |
|---|---|---|---|---|
| | **Chair: Sofiya OSTROVSKA**<br>**Co-Chair: Nurten URLU** | **Chair: Yelda AYGAR**<br>**Co-Chair: Turhan KOPRUBASI** | **Chair: Ali KONURALP**<br>**Co-Chair: Derya AVCI** | **Chair: Ali KIRACI**<br>**Co-Chair: Adnan ALDEMIR** |
| **16:50**<br>**-**<br>**17:10** | **Tuba TUNC-**<br>On Hermite-Hadamard Type Inequality for h-convex Functions on Fractal Set | **Yelda AYGAR -**<br>Scattering Solution Of Impulsive Sturm-Liouville Equation in Quantum Calculus | **Derya AVCI -**<br>Diffusive Stresses based on A Conformable Advection-Diffusion Equation | **Nurgul GOKGOZ KUCUKSAKALLI –**<br>Stochastic Modeling of Tumor-Immune Systems |
| **17:10**<br>**-**<br>**17:30** | **Tahir COSGUN -**<br>On the Solution of Fredholm Integral Equations of the First Kind | **Seyda SOLMAZ -**<br>Discrete Dirac System with a Point Interaction | **Ali KONURALP -**<br>Fractional VIM Composed with Jumarie Type Derivative for Time-Fractional Nonlinear Functional PDEs Having Proportional Delays | **Kurtul KUCUKADA –**<br>Optimum Sampling Times and Measurement Locations for Tubular Reactors |
| **17:30**<br>**-**<br>**17:50** | **Sofiya OSTROVSKA -**<br>On the Lupaş q-transform | **Emel YILDIRIM -**<br>Bound State and Spectral Singularities of Impulsive Schrödinger Equation | **Assia FRIOUI -**<br>Fractional Boundary Value Problems on the Half Line | **Adnan ALDEMIR –**<br>Nonlinear Dynamic Characterization of a Liquid Level Control System |
| **17:50**<br>**-**<br>**18:10** | **Nihat AKGUNES -**<br>A Note on the Upper Bound of Average Distance | **G. Gulcehre OZBEY -**<br>The Resolvent of Discrete Sturm-Liouville Equation with Eigenparameter in Boundary Condition | **Birol IBIS -**<br>A New Numerical Method for Solving Variable order Fractional Differential Equations | **Ismail Naci CANGUL -**<br>Effect of Edge Deletion and Addition on Zagreb Indices of Graphs |
| **18:10**<br>**-**<br>**18:30** | **Derya DURGUN -**<br>Average Covering Number for Some graphs | **Adil HUSEYIN -**<br>An Eigenvalue Problem for Quadratic Pencil Of Q-Equations And Its Applications | **Tufan DOGRUER -**<br>Lead and Lag Controller Design by Optimization Method in Fractional Order Control Systems | **Adnan ALDEMIR –**<br>Identifying The Hammerstein-Wiener Model for a Liquid Level Control System |

## 29 April Saturday, 2017

| | Blue Hall<br>Parallel Session 1-11<br>Mathematical Tools | Red Hall<br>Parallel Session 2-7<br>Numerical Methods | Auditorium 2<br>Parallel Session 3-9<br>Mathematical Modelling | Auditorium 3<br>Special Session 4-6 | Auditorium 4<br>Parallel Session 4-2<br>Signal Processing |
|---|---|---|---|---|---|
| | **Chair: Hasan BULUT**<br>**Co-Chair: Naceri MOSTEPHA** | **Chair: Seda EFENDIOGLU**<br>**Co-Chair: Bouserhane ADNANE** | **Chair: Muharrem Tuncay GENCOGLU**<br>**Co-Chair: Khalid WANI** | **Chair: Alireza Khalili GOLMANKALEH**<br>**Co-Chair: Ilknur YESILCE** | **Chair: J. A. Tenreiro MACHADO**<br>**Co-Chair: Abdelhamid HAMIDI ALAOUI** |
| **09:00 - 09:20** | **Mehmet Niyazi CANKAYA** – On The Inference of Location and Scale Model in Estimating Functions | **Bouserhane ADNANE** - Bose-Einstein Distribution and Energy Spectral Density Within Padé Approximation | **Muharrem Tuncay GENCOGLU** - A New Method of Steganographic Cryptology | **Ferit GURBUZ**- Multilinear BMO Estimates for the Commuttators of Multilinear Fractional Maximal and Integral Operator on the Product Generalized Morrey Spaces | **Abdelhamid HAMIDI ALAOUI** - Statistical-Arbitrage-Based Trading Strategies in the Casablanca Stock Exchange: A First Investigation |
| **09:20 - 09:40** | **Naceri MOSTEPHA** - Existence and Nonexistence of Positive Solutions for Singular Nth-Order Three-Point Nonhomogeneous Boundary Value Problem | **Khalid WANI** - Mathematical and Numerical Analysis of Thermal Disturbance on Cancerous Tissues Under the Local Heat Therapy | **Rezzoug IMAD** - Sentinels Punctual Sentinel | **Ilknur YESILCE** - Hermite-Hadamard Inequality Involving Riemann-Liouville Fractional Integral for B-convex Functions | **A. Hakan AKTAS** - Application of PCA-PCR and ICA-PCR Models to Spectrophotometric Data for Quantitative Analysis of a Caffeine and Paracetamol in a Pharmaceutical Product |
| **09:40 - 10:00** | **Nadir Benkaci ALI** - Positive Pseudo-Symmetric Solutions for A Three Point Boundary Value Problem Involving a Generalized P(T)-Laplacian Operator | **Seda EFENDIOGLU** - An Alternative Computerized System for Step-by-Step Solution Analysis of Algebra Problems With Multiple Mathematical Expressions | **Muharrem Tuncay GENCOGLU** - Use Of Extented Laplace Transform at Solution of Control Engineering Problems | **Gurkan KAVURAN** - A Model Reference Control Scheme by MIT Rule with Fractional Order Sliding Surface | **A. Hakan AKTAS** - Simultaneous Determination of Codeine and Acetaminophen in Pharmaceutical Preparation by PCA-PCR Chemometric Methods |
| **10:00 - 10:20** | **Esma ATES** - Exact Soliton Solutions for The Klein-Gordon-Schrödinger Equation with Power Law Nonlinearity | | **Umut SEZEN** - Hf Signal Propagation In Ionosphere Using Calculus of Variations | **Ferit GURBUZ** - Adams-Spanne Type Estimates for the Commutators of Fractional Type Sublinear Operators in Generalized Morrey Spaces on Heisenberg Groups | **A. Hakan AKTAS** - Spectrophotometric Determination of Trazodone and Sertralin in Tablets by ICA-ANN Calibration Method |
| **10:20 - 10:40** | **Mehmet Niyazi CANKAYA** - Least Informative Distributions Based on Divergences | | **Ali DELICEOGLU** - Structural Bifurcation of Divergence-Free Vector Fields Near Non-simple Degenerate Points with Double Symmetry | | |

| | **Auditorium 5**<br>**Special Session 4-7** | **Auditorium 6**<br>**Parallel Session 3-10**<br>**Mathematical Modelling** | **L-111**<br>**Special Session 1-4** | **L-112**<br>**Special Session 7-3** | **K-101**<br>**Special Session 6-4** |
|---|---|---|---|---|---|
| | **Chair: Guo-Cheng WU**<br>**Co-Chair: Sadia ARSHAD** | **Chair: Ipek GULER**<br>**Co-Chair: Ali YESIL** | **Chair: Ishak ALTUN**<br>**Co-Chair: Mahpeyker OZTURK** | **Chair: Nurhan DUDAKLI**<br>**Co-Chair: Shehab A. IBRAHEM** | **Chair: Bilender PASAOGLU**<br>**Co-Chair: Huseyin TUNA** |
| **09:00 - 09:20** | **Ozlem IMIK** - Fractional Order Filter Discretization by Particle Swarm Optimization Method | **Ali KIRACI** - Analysis of the Integrated Intensity of the Central Peaks Calculated as a Function of Temperature in the Ferroelectric Phase of Lithium Tantalate | **Ekber GIRGIN** - Common Fixed Points of Twisted Cyclic (α,β)- F – Contraction on Modular Spaces | **Mumin Emre SENOL** - Solving Resource Constrained Project Scheduling Problems via Con-straint Programming | **Bilender PASAOGLU** - Scattering Theory and Spectral Analysis of The Direct Sum Sturm-Liouville Operators |
| **09:20 - 09:40** | **Remziye SARIAYDIN** - On Solutions of Fractional Sturm Liouville Problem | **Ali YESIL** - The Relation Between the Refractive Index of the Equatorial Ionospheric F2 Region and Long-term Solar Indices | **Abdurrahman BUYUKKAYA** - Some Common Fixed Point Theorems for Expansion Mappings via (α,β) admissible Pairs in 2-Metric Spaces | **Nurhan DUDAKLI** - Solving Straight and U-shaped Assembly Line Balancing Problems via Constraint Programming | **Huseyin TUNA** - Spectral Analysis of Q-Fractional Sturm-Liouville Operators |
| **09:40 - 10:00** | **Ozlem IMIK** - Discretization of Fractional Order Transfer Function by Particle Swarm Optimization Method | **Nagehan ALSOY AKGUN** - DRBEM Solution of Natural Convection Flow of Nanofluid Under A Uniform Magnetic Field | **Emine KILINC** - Some Fixed Point Results for Caristi Type Mappings in Modlar Metric Spaces | **Mumin Emre SENOL** - Multi Agent-Based Stochastic Diffusion Search Algorithm for Solving Single Machine Total Weighted Tardiness Problem | **Bilender PASAOGLU** - Dissipative Singular Matrix Sturm-Liouville Operators with General Boundary Conditions |
| **10:00 - 10:20** | **Sema GULBAHAR** - Numerical Solutions of The Nonlinear Time-Fractional KdV-Burgers-Kuramoto Equation | | **Neslihan KURU** - Common Fixed Point Theorems for Multivalued Mappings in Complex Valued b- Metric- Like Spaces | **Nurullah YILMAZ** - A New Smooth and Descent Method for Global Optimization | **Huseyin TUNA** - Basis Properties of the Root Functions of Non-Self Adjoint Q-Sturm-Liouville Problems |
| **10:20 - 10:40** | | | **Gulsum ULUSOY ADA** - A New Durrmeyer Type Modification of Szasz Mirakyan Operators | **Shehab A. IBRAHEM** - New Global Optimization Technique by Using Auxiliary Function Method in Directional Search via Pieswise Smoothing | **Bilender PASAOGLU** - Spectral Problems of Singular Hamiltonian System with An Eigenparameter in The Boundary Condition |

| | Blue Hall<br>Parallel Session 1-12<br>Mathematical Tools | Red Hall<br>Parallel Session 3-11<br>Mathematical Modelling | Auditorium 2<br>Special Session 6-5 | Auditorium 3<br>Parallel Session 1-13<br>Mathematical Tools | Auditorium 4<br>Parallel Session 1-14<br>Mathematical Tools |
|---|---|---|---|---|---|
| | **Chair: Abdalla TALLAFHA**<br>**Co-Chair: Esma ATES** | **Chair: Yelda AYRIM**<br>**Co-Chair: Zafer BEKİRYAZICI** | **Chair: Turhan KOPRUBASI**<br>**Co-Chair: Yelda AYGAR** | **Chair: Hacı Mehmet BASKONUS**<br>**Co-Chair: Semih YILMAZ** | **Chair: Nurten URLU**<br>**Co-Chair: Esra COLAK** |
| **11:00 - 11:20** | **Khalid AL-ZOUBI** - A Note on Locally Paracompact and Locally Metacompact Spaces | **Zafer BEKIRYAZICI** - Analysing the Early–Stage Dynamics of a Model for Ebola Virus Under Random Effects | **Huseyin TUNA** - Non-Selfadjoint Sturm-Liouville Operators with a Spectral Parameter in the Boundary Condition on Time Scales | **Semih YILMAZ** - Bi-Periodic Fibonacci and Lucasquaternions | **Idris A. Masoud ABDULHAMID** - A Global Optimization Technique by Using Auxiliary Function Method in Directional Search via Bezier Surface |
| **11:20 - 11:40** | **Abdalla TALLAFHA**- Contractions on semi-linear Uniform spaces | **Yelda AYRIM** - A Mathematical Modelling for Determining Job Rotation Strategy Considering Mental and Physical Fatique | **Basak EREN** - Scattering Solutions of Impulsive Sturm-Liouville Equations | **Elif TAN** - On the Generalized Fibonacci Quaternions and Octanions | **Esra COLAK** - Mathematical Study Of Virtual Tree Leaves Derived From Divisors |
| **11:40 - 12:00** | **Valery YAKHNO** - Waves in Magneto-Electro-Elastic Media as Solutions of a Symmetric Hyperbolic System | **Debakla MOHAMMED** - A Fuzzy Logic Method for MRI Brain Segmentation | **Fatma HIRA** - A Trace Formula for the Sturm-Liouville Type Equation with Retarded Argument | **Faik BABADAG** - Dual Homothetic Exponential Motions with Dual Tessarines | **Ilker Burak GIRESUNLU** – On the Lie SymmetryAnalysis and Group Invariant Solutions of Some Logarithmic Evolution Equations |
| **12:00 - 12:20** | **Yoksal A. LAYLANI** - A New Spectral Conjugate Gradient Algorithm for Unconstrained Optimization | **Ebru COPUROGLU** - Quantum Corrections to Second Virial Coefficient with Lennard-Jones (12-6) Potential | **Dilara KARSLIOGLU** - Scattering Solutions of Impulsive Discrete Strum-Liouville Equations | **Ismet CINAR** - Cohomology Structure of Digital Khalimsky Spaces | **Nurten URLU** - Gröbner - Shirshov Basis on A Special Semigroup |
| **12:20 - 12:40** | **Kemal SUBULAN** - A Novel Constrained Fuzzy Arithmetic Based Approach for Designing a Reverse Supply Chain Network with Fuzzy Decision Variables | **Mohd HANIFF BIN-OSMAN** - Rescheduling Periodic Rail Track Inspection Schedule Based on Cost-Benefit Analysis | | **Fadime GOKCE** - On Absolute Euler Spaces and Related Matrix Operators | **Umit SARP** - A Study of Properties of the Absolute Möbius Divisor Function and Their for Leaf Veins |
| **12:40 - 13:00** | | **Ebru COPUROGLU** - Analytical Evaluation of the Uehling Potential Using Binomial Expansion Theorems | | **Hacı Mehmet BASKONUS** - Some Wave Simulation Properties to the (3+1) dimensional Kadomtsev-Petviashvili Equation | **Metin KOPARIR** - Density Functional Calculations of the Electronic Structure of new bis α-Aminoalkylphosphinic Acid Derivative |

| | Auditorium 5<br>Special Session 1-5 | Auditorium 6<br>Parallel Session 3-12<br>Mathematical Modelling | L-111<br>Special Session 7-4 | L-112<br>Special Session 4-8 | K-101<br>Special Session 4-9 |
|---|---|---|---|---|---|
| | **Chair: Farshid KHOJASTEH**<br>**Co-Chair: Veysel NEZIR** | **Chair: Ali YESIL**<br>**Co-Chair: Ilker GOLCUK** | **Chair: Cigdem DINCKAL**<br>**Co-Chair: Burcu K. OZBEL** | **Chair: Kottakkaran Sooppy NISAR**<br>**Co-Chair: Mehmet Niyazi CANKAYA** | **Chair: Hammouch ZAKIA**<br>**Co-Chair: Ozlem DEFTERLI** |
| **11:00 - 11:20** | **Maypeyker OZTURK** - Some Recent Results on Fixed Point Theorems | **Ilker GOLCUK** - Fuzzy Cognitive Maps via Nonlinear Hebbian Learning and Artificial Bee Colony Algorithm | **Burcu K. OZBEL** - Comparison of Grey and ARIMA Models for Production Forecasting In Marble Industry | **Mehmet Niyazi CANKAYA**- Application of Fuzzy Fractional Derivatives in Statistics | **Hammouch ZAKIA** - Numerical Simulations Control and Synchronization a New Fractional-order Chaotic System Involving Atangana-Baleanu Derivative |
| **11:20 - 11:40** | **Isıl Arda KOSAL** - Common Fixed Point Theorems in Elliptic Number Valued Metric Spaces | **Ali YESIL** - The Compare of Conductivity Tensor of Cold and Warm Plasma for Equatorial Ionospheric F2 Layer in the Equinox Days | **Cigdem DINCKAL** - Finite Element Analysis of Nano Scale Vibration of Microtubes in Living Cells: Nonlocal Euler Bernoulli Neam Modelling | **Kottakkaran Sooppy NISAR** - On certain fractional integrals involving generalized k-Bessel function | **Mehmet YAVUZ - Necati OZDEMIR** - Numerical Solutions of Fractional Partial Differential Equations by Using Laplace Transform |
| **11:40 - 12:00** | **Hakan SAHIN**- A New Generalization of M- Metric Space and Feng-Liu Type Fixed Point Theorems for Multivalued Mappings | **Ilker GOLCUK** - Comparing New Granular Computing Paradigms with Traditional Fuzzy Approaches in Analytical Hierarchy Process | **Burcu K. OZBEL** - An Interval Programming Model for Balancing Assembly Lines | **Gulsen YAMAN** - Predicting Air Temperature Distribution in the Vicinity of a Dry Resin Type Transformer Using Fractional Partial Differential Equations | **Nuri OZALP** - Fractional Fourier Transform Method Coupled with the CTIT Transformation |
| **12:00 - 12:20** | **Ishak ALTUN - Gonca DURMAZ** - New Fixed Point Results for P-contractive Mappings on Metric Spaces | **Ali KIRACI** - Calculation of the Damping Constant, Relaxation Time and the Activation Energy of Raman Modes in Stoichiometric LiTaO3 | **Abdelkader ELMOUMEN** - Stochastic Approximation in Nonlinear Calibration Problem | **Ferit GURBUZ** - Fractional Type Multilinear Commutators Generated by Fractional Integral with Rough Variable Kernel and Local Campanato Functions on Generalized Vanishing Local Morrey Spaces | **Fatemah Soleyman** - On (p, q)-Classical Orthogonal Polynomials and Their Characterization Theorems |
| **12:20 - 12:40** | **Gulsum ULUSOY ADA** - On Approximation Properties of Generalized Durrmeyer Operators | **Nurhan DUDAKLI** - A GRASP Based Algorithm to Reduce Service Time in Fully Automated Parking System | **Hanan OUHADER** - A Mixed-Integer Programming Model For Horizontal Logistics Collaboration In Distribution Chain | **Mehmet Niyazi CANKAYA**- Applications of Fractional Entropies on Image Analysis | |
| **12:40 - 13:00** | **Gonca DURMAZ** - The relations between F-contractions and weakly Picard operators | | | | |

## Poster Sessions

| | |
|---|---|
| 1 | **Saeid JAFARI** -<br>A Study on the Pressure Oscillations in the Water Distribution Network Before and Behind the Solenoid Valve |
| 2 | **Amir KHAN** -<br>Exact Solution of Unsteady Fractional Jeffrey Fluid Produced by A Plate Between Two Side Walls |
| 3 | **Mehmet Niyazi CANKAYA** -<br>Composite Type Likelihood Inference for Location and Scale Parameters |
| 4 | **Ali Khalili GOLMANKHANEH** -<br>Fractal Time Motion on Particle Diffusion |
| 5 | **Mohsen ALIPOUR** -<br>Numerical Investigation on Fractional Variational Problems Depending on Indefinite Integrals |
| 6 | **Jordan HRISTOV** -<br>STOKES' First Problem for A Casson Fluid: From Integer to Fractional Models by Integral-Balance Approach |
| 7 | **Abolhassan RAZMINIA** -<br>Optimal Control of a CSTR Process with Frequency Domain Evaluation |
| 8 | **Abolhassan RAZMINIA** -<br>On Fractional Order Performance Index in Optimal Control Problems |
| 9 | **Gokhan TEMIZEL** -<br>Digital Khalimsky Manifolds |
| 10 | **Hatice Sevde DENIZALTI** -<br>Persistent Homology Groups |
| 11 | **Zuleyha OZTAS** -<br>Spin Orbit Coupled BEC in a random potential |
| 12 | **Sadia ARSHAD** -<br>Dynamics of Cancerous Tumor Model of Fractional Order |
| 13 | **Belalmi RABAB** -<br>Thermal Analyse of Solar Chimney |
| 14 | **Ipek GULER** -<br>Photoluminescence and Optical Absorption Properties of Silicon Nitride Thin Films |

***Prepared by**

**Esra Bag, Ulas Gulec**

## 7. MME 2017 ABSTRACTS

● **ABDELJAWAD, Thabet*, ALZABUT , Jehad* , JARAD, Fahd**,** *Prince Sultan University, SAUDI ARABIA, **Cankaya University, TURKEY

*A Generalized Lyaponuv Inequality in the Frame of Conformable Derivatives*

In this paper, we prove a new generalized Lyaponuv inequality for a conformable boundary value problem (BVP) of order $\alpha \in (1,2]$. Indeed, it is shown that if the boundary value problem

$$(T_\alpha^a y)(t) + q(t)y(t) = 0, \qquad t \in (a,b), \qquad y(a) = y(b) = 0$$

has a nontrivial solution, where q is a real valued continuous function on [a,b], then

$$\int_a^b |q(s)|\, ds > \frac{4(b-a)}{[(3-\alpha)b-a][(\alpha-1)b-a]}.$$

Moreover, a Lyaponuv type inequality is obtained for a sequential conformable BVP. Some examples are given and an application to conformable Sturm-Liouville eigenvalue problem is analyzed.

● **ABDELJAWAD, Thabet,** Prince Sultan University, SAUDI ARABIA

*Fractional Operators with Nonsingular Kernels of Order α > 1 and Lyaponuv Type Inequalities*

Fractional operators with exponential and Mittag-Leffer kernels are extended to order bigger than one and their higher order correspondent integral operators are confirmed. These type of operators have been initiated recently by M. Caputo, M. Fabrizio and A. Atagana, D. Baleanu, repectively. However, the order was in the unit interval [0,1]. As an application to this extension, Lyaponuv type inequalities for boundary value problems, of order $2 < \alpha \leq 3$, in the frame of Riemann ( for CFR and ABR operators) are proved. Further, some existence and uniqueness theorems are proved and examples are given to illustrate the applicability of the obtained results.

● **ABDELKADER, Elmoumen,** University Center of Tamanrasset, ALGERIA

*Stochastic Approximation in Nonlinear Calibration Problem*

Calibration, also called inverse regression, is a classical problem which often appears in a regression setup under fixed design. The aim of this paper is to propose a stochastic approximation method which gives an estimated solution for a nonlinear calibration problem.

● **SAHINER, Ahmet, ABDULHAMID, Idris A. M. ,** Suleyman Demirel University, TURKEY

*A Global Optimization Technique by Using Auxiliary Function Method in Directional Search via Bezier Surface*

We consider the problem of finding a global minimaizer point of a given nonsmooth unconstrained objective function. Our approach is to concentrate the variety of the objective function $f$ along the direction $d$ from a flow point $x$, to such an extent that we presented a thought of line search strategy. The algorithm of this method is proposed in order to make smooth the objective function, and then reduce it into one dimensional case at each direction, so that it could be minimized using an auxiliary function approach.

● **ABU-DAWWAS, Rashid,** Yarmouk University, JORDAN

*Almost First Strongly Graded Rings*

Let $G$ be a group with identity $e$ and $R$ be a $G$-graded ring with unity 1. In this article, we introduce the concept of almost first strongly graded rings and prove that it properly contains the class of first strongly graded rings. We introduce when almost first strongly graded rings are separable over their identity component. We show that If $R$ is an almost first strongly graded ring, then $R/T$ is separable if and only if $1 \in tr_\xi(Z^*(T))$. Also, we introduce the concept of almost crossed product over the support and study its relations with almost first strongly graded rings.

● **ACAN, Omer*, BALEANU, Dumitru**,** *Siirt University, TURKEY, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*On the Solutions of Systems of Differential Equations with Conformable Derivative*

The aim of this presentation to extend the applications of conformable differential transform method (CFDTM) and the conformable Adomian decomposition method (CADM). Also we aim to provide approximate solutions for nonlinear system of fractional differential equations with conformable derivative of the form:

$$\begin{aligned} T_{\alpha_1} u_1(t) &= f_1(t, u_1, u_2, \ldots, u_n) \\ T_{\alpha_2} u_2(t) &= f_2(t, u_1, u_2, \ldots, u_n) \\ &\vdots \\ T_{\alpha_n} u_n(t) &= f_n(t, u_1, u_2, \ldots, u_n) \end{aligned} .$$

For a better understanding of the subject, we apply these methods on the linear and nonlinear problems. Then we compare the results obtained for these two methods by the aid of tables and graphs.

● **ADNANE, Bouserhane, ABDELAZIZ, Yahiaoui,** Université Tahri Mohammed de Béchar, ALGERIA

*Bose-Einstein Distribution and Energy Spectral Density within Padé Approximation*

A theorem due to Padé stipulate that all of the fonction which pocess a Maclaurin expansion, can be approched within its Padé approximants of the form $P[n,m] = h_n(x)/k_m(x)$ avec $n+m+1 \leq l$ the degree of the polynom of Maclaurin. We try to apply such a theorem about rational fractions in the case of black body electromagnetic radiation. We try to show that the evaluation of Bose-Einstein distribution and enrgy spectral density radiated by a black body can be approched as far as possible in a determined frequencies interval of the electromagnetic radiation spectrum.

● **BALEANU, Dumitru*, AGILA, Adel****, *Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA, ******Omar Al-Mukhtar University, LIBYA

*The Application of Variable-Order Caputo Fractional Derivative to Obtain the Response of A Fractional Damped Oscillatory System*

The fractional calculus is a promising applied mathematical tool to different disciplines. Some dynamic systems can be precisely represented as fractional systems due to their physical properties. A fractional damped oscillatory system is mathematically modeled by means of fractional order differential equation. In this model the damping force acting on the vibrating system is proportional to the fractional derivative of the displacement. The variable-order Caputo fractional derivative and an approximation technique are utilized to obtain the system responses. The approximation is accomplished by using a numerical discretization technique. Based on the definition of variable-order Caputo fractional derivative, the system response is investigated for different system parameters. The approximation of the system response is verified to show the efficiency of the applied techniques.

● **AGRAZ, Melih, PURUTCUOGLU, Vilda,** Middle East Technical University, TURKEY

*Empirical Copula in the Detection of Batch Effects*

The activation of the complex biological systems is presented by different mathematical expressions, called models, under various assumptions. One of the common modelling types in this description is the steady-state type of modelling. In these equations, we assume that the stochastic behaviour of the model may not be observed under constant volume and temperature, and the mean change in states of the systems‘ components is bigger than the variation of the states. Since this type of models needs less informations about the system with respect to the stochastic models, it is the most common modelling type. In this study, we particularly deal with the steady-state models and suggest a pre-processing step that is based on the empirical copula, for those models. We use the empirical copula, also called normal copula, for eliminating the batch effects in the measurements by transforming the data to fit the normality. Then, we implement both parametric and nonparametric models under this branch. Among alternatives, we choose the Gaussian graphical model and the probabilistic Boolean network model in parametric modellings and select the lasso-based MARS as the recent powerful nonparametric approaches. In the analyses, we evaluate the performance of

all models and effect of the empirical copula based on various accuracy measures via Monte Carlo studies.
Acknowledgement: The authors thank the BAP project (no: BAP-01-09-2016-002) at METU for its support.

● **AKTAS, Mustafa F. , CAKMAK, Devrim, AHMETOGLU, Abdullah,** Gazi University, TURKEY

*The Best Constant of Lyapunov-Type Inequality for Fourth-Order Linear Differential Equations with Anti-Periodic Boundary Conditions*

This paper is concerned with anti-periodic boundary value problems for fourth-order linear differential equations. Our study is based on the absolute maximum of Green's function corresponding to anti-periodic boundary value problem. Thus, the best constant of Lyapunov-type inequality for the problem is found. The results of this paper improve early results in the literature. In addition, an application of the obtained Lyapunov-type inequality for eigenvalue problem is given.

● **AKGUL, Ali*, KARATAS, Esra**, AMEEN RAHEEM, Salar*,** *Siirt University, TURKEY, **Canakkale Onsekiz Mart University, TURKEY

*Solutions of Nonlinear Differential Equations by Reproducing Kernel Method and Group Preserving Scheme*

We implement the reproducing kernel method and $SL(2,R)$-shooting method to the nonlinear differential equations. Powerful techniques are demonstrated by reproducing kernel functions. The reliable numerical approximations to the solution of this equation are calculated by two novel approaches which results are in good agreement. Numerical results are shown in order to prove the certainty of the techniques.

● **AKGUL, Ali*, KARATAS, Esra****, **SEDEEQ MUSTAFA, Idrees*,** *Siirt University, TURKEY, **Canakkale Onsekiz Mart University, TURKEY

*Solutions of Initial Value Problems by Reproducing Kernel Method and Group Preserving Scheme*

We apply reproducing kernel method and group preserving scheme for investigating initial value problems. Strong techniques are shown by reproducing kernel functions. The numerical approximations to the exact solution are found. These approximations prove the certainty of the methods.

● **AKGUNES, Nihat*, CEVIK, Ahmet S.**, CANGUL, Ismail N.***,** *Necmettin Erbakan University, TURKEY, **Selcuk University, TURKEY, ***Uludag University, TURKEY

*A Note on the Upper Bound of Average Distance*

In this study, we mainly define a new bound for average distance of a simple connected graph via some other graph parameter.

● **AKMAN, Tugba*, ARSHAD, Sadia**,***, BALEANU, Dumitru****, TANG, Yifa**, ***University of Turkish Aeronautical Association, TURKEY, **LSEC, ICMSEC, Academy of Mathematics, CHINA, ***COMSATS Institute of Information Technology, PAKISTAN, ****Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*The Effect of Obesity on Fractional Cancer Tumor Growth Model*

A mathematical model to express the interaction of cancerous tumor cells, normal cells and immune cells is presented in the study [1]. It is known that development of cancerous tumor cells are affected/accelerated by obesity and overnutrition. To investigate the effect of fat on the immune system, a cancer-obesity model has been constructed in the paper [2]. Numerical results indicate that a low caloric diet results in a smaller tumor population when compared to a high-caloric diet. In this study, we consider the fractional order tumor model to discuss the interaction between cancer and obesity, since formation of tumor cells might last for years and fractional derivatives capture memory effects in the system [3]. We discuss equilibrium points and their stability by presenting some numerical results.

● **AKSOY, Umit,** Atilim University, TURKEY

*Existence and Uniqueness of Fixed Points of Maps Satisfying C-Condition in Modular Metric Spaces*

Modular metric spaces are generalizations of Orlicz spaces and classical modular spaces. There are many recent advances on the study of fixed point results in modular metric spaces. In this study, we investigate the existence and uniqueness of fixed points of maps satisfying Suzuki *C*-condition in modular metric spaces.

● **AKTAS, A. Hakan,** Suleyman Demirel University, TURKEY

*Spectrometric Multi Component Determination of Vanillin, Maltol and Ethyl Maltol in Candy Foods Artificial Neural Network Calibration*

Maltol (MAL), ethyl maltol (EMA) and vanillin (VAN) are important materials used in food industry. These compounds are widely used in dairy and artificial dairy products such as candies, cookies, chocolate, beverages and etc [1]. These compounds can enhance the scent of foods, they are synthetic perfumes and food additives. If large amounts of these flavor enhancers are ingested they cause headaches, nausea etc. Because of volatility, instability and insoluble properties in water, they are not easily directly determined in solution [2]. Consequently, it is important to determine their contents in foods. Artificial neural network (ANN) calibration was proposed for simultaneous determination quantitative analysis of mixture consist of maltol, ethyl maltol and vanillin in commercial preparations. In the chemometric techniques, the concentration matrix was prepared by using the synthetic mixtures containing these food additives. The absorbance matrix corresponding concentration matrix was obtained by measuring the absorbance's at nine wavelengths in the range 260 - 340 nm for the zero-order spectra. Chemometric calibrations were constructed by using absorbance matrix and concentration matrix for the prediction of the unknown concentration of maltol, ethyl maltol and vanillin in their mixture. The numerical values were calculated by using "MATLAB R2013a" software. The obtained results were statistically compared with each other. Suitable amount of working solutions of maltol, ethyl maltol and vanillin or their

mixture, were transferred to 25 mL volumetric flask followed by the addition of 5.0 mL Britton-Robinson buffer solution (pH 2.87), diluted to the mark with the doubly distilled water and mixed well. Several commercial food samples were purchased from the local market in Isparta city. The food samples were ground to a fine powder with a mortar and pestle. 20.0 g of this powder and 50 mL anhydrous ethanol were placed into a 100 mL Erlenmeyer flask and shaken by a laboratory shaker for 2 h. This mixture was then transferred to a 10 mL centrifuge tube and centrifuged 5000 rpm for 5 min. The clear part of solution in the tube was used for analysis. Suitable amount of this sample was transferred into a 25 mL flask, added 5.0 mL 95% ethanol and then the solution was analyzed by the analytical procedure as described above. All the methods were applied to the prepared solutions. Calculated results are presented in Table 1 [3]. The calculated values from the statistical test did not exceed the critical statistical values, indicating that there was no significant difference among the methods. ANN calibration method is very suitable choice to methods for the quality control of commercial food product without priority procedure such as separation, extraction and pre-concentration. The proposed methods have great promise for the routine analysis of food additives.

**Table 1.** Experimental results of commercial preparation of proposed method.

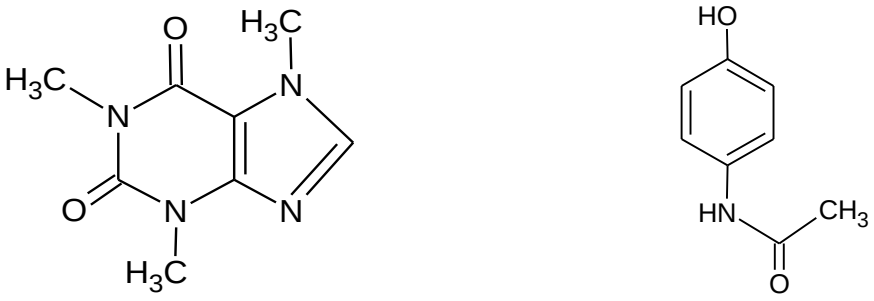
| Samples | MAL (μg/g) | EMA (μg/g) | VAN (μg/g) |
|---|---|---|---|
| ANN Method | | | |
| A | 0.1208 | 0.1188 | 0.1884 |
| B | 0.0656 | 0.0512 | 0.3202 |
| C | 0.1704 | 0.1032 | 0.4428 |
| D | 0.0886 | 0.1082 | 0.1256 |

Sample (A) Vanilla. Hayat Food Production Co. Ltd. (B) Candy. Kent Food Production Co. Ltd. (C) Chocolate. Ulker Food Production Co. Ltd. (D) Pudding. Ulker Food Production Co. Ltd. Results obtained are the average of ten experiments for each method.

● **AKTAS, A. Hakan,** Suleyman Demirel University, TURKEY

*Application of PCA-PCR and ICA-PCR Models to Spectrophotometric Data for Quantitative Analysis of a Caffeine and Paracetamol in a Pharmaceutical Product*

Paracetamol (PCT) and caffeine (CAF) are active substance widely employed in pharmaceutical preparation and are frequently combined in the same medicine. PCT is a popular antipyretic and analgesic agent [1]. CAF, a methylated xanthine and potent stimulant of the central nervous system, has been added to PCT and CAF in various combinations. Worked in the chemical structures of these two substances are shown in Figure 1.




Caffeine Paracetamol

Figure.1a.b. Structures of the two studied compounds

Therefore, the interest in the development of simultaneous analysis methods, which do not evolve a preliminary separation step, suited for routine pharmaceutical analysis is justified. The quality control of dosage form preparations of drug requires reliable and quick analytical methods. UV/VIS spectrophotometry is by far the instrumental technique of choice of industrial laboratories, owing mainly to simplicity, often demanding low cost equipment. Simultaneous quantitative analysis of pharmaceuticals containing multi-active compounds is difficult to perform by classical spectrophotometric method due to overlapping spectra [2]. In recent years, multivariate chemometric methods seem to be the techniques showing a best performance in terms of complex mixture solution [3]. A multivariate calibration-prediction techniques, principal component principal regression models were applied to the spectrometric multicomponent analysis of the drug containing caffeine and paracetamol without any separation step. The selection of variables was studied. A series of synthetic solution containing different concentrations of PCT and CAF were used to check the prediction ability of the PCA-PCR and ICA-PCR. The results obtained in this investigation strongly encourage us to apply these techniques for a routine analysis and quality control of the drug. Determination results obtained by the application of PCA- PCR and ICA-PCR models to the tablet solutions containing PCT and CAF in Vermidon® Oral tablet formulations were summarized in Table 1. The analysis obtained from these method was found satisfactory for the quantitative analysis of commercial tablet. Moreover, proposed procedures gave results in agreement with the labeled drugs content when applied on pharmaceutics.

Table 1. Assay results for the commercial pharmaceutical formulation (mg/tablet).

| | **PCA - PCR** | | **ICA - PCR** | |
|---|---|---|---|---|
| **No** | PCT | CAF | PCT | CAF |
| **1** | 503.8 | 29.8 | 502.6 | 29.7 |
| **2** | 498.2 | 30.5 | 501.1 | 30.2 |
| **3** | 502.0 | 28.8 | 500.8 | 29.8 |
| **4** | 509.2 | 28.5 | 503.4 | 28.6 |
| **5** | 498.8 | 29.4 | 499.8 | 29.6 |
| **6** | 498.2 | 29.8 | 502.2 | 29.8 |
| **7** | 501.2 | 30.4 | 500.6 | 30.3 |
| **8** | 500.3 | 29.8 | 499.6 | 29.5 |
| **9** | 495.7 | 30.3 | 498.0 | 30.2 |
| **10** | 499.8 | 29.9 | 500.6 | 29.3 |
| **Mean** | 500.72 | 29.72 | 500.87 | 29.7 |
| **RSD** | 3.72 | 0.66 | 1.57 | 0.50 |

Claim label: 500 mg PCT and 30 mg CAF/tablet

● **AKTAS, A. Hakan,** Suleyman Demirel University, TURKEY

*Simultaneous Determination of Codeine and Acetaminophen in Pharmaceutical Preparation by PCA-PCR Chemometric Methods*

In this study, powerful chemometric calibration method, principal component analysis - principle component regression (PCA - PCR) was successfully applied to the simultaneous determination of Codeine (COD) and Acetaminophen (ACE) in pharmaceutical preparations

without using any separation step. The data of UV-Visible Spectroscopy applied to the chemometric calculations. Codeine is a morphine (morphine 3-methyl ether), consisting of morphine by methylation of the phenolic OH group[1]. Morphine be methylated in a way that reduces the impact of its analgesic and addictive activity significantly, but it does not weaken over the antitussive activity. Codeine, opium (opium) are contained in the natural rate of about 0.5% is obtained by extraction from opium or poppy capsule or with morphine methylation is carried out by semi-synthesis. Codeine use is subject to control, according to the legislation in Turkey but some preparations containing codeine "drug" does not count [2]. For the validation of this chemometric method, a calibration set of 15 binary mixtures containing compounds in the working range of 5-25 μg/mL for COD and 8-40 μg/mL for ACE was prepared in % 96 Ethanol. Calibration sets 200-300 nm range absorption spectra were recorded. Two chemometric calibrations were constructed by using the relationship between the calibration set and its corresponding absorption data obtained in the range 220-280 nm. The synthetic mixtures of two drugs were used for the validity of the calibrations. Means recoveries (percent) and relative standard deviation of PCA - PCR methods were found to be % 100,02 / % 0,98 and %100,04 / % 1,24 for COD ; % 100,32 / % 0.56 and % 100,05 / % 0,68 for ACE respectively. In the next step, the PCA - PCR method was applied to the simultaneous determination of COD and ACE in commercial pharmaceutical preparations and successful results were obtained.

● **AKTAS, A. Hakan, AYTEKIN, Nuray,** Suleyman Demirel University, TURKEY

*Spectrophotometric Determination of Trazodone and Sertralin in Tablets by ICA –ANN Calibration Method*

Depression, whether mild or severe forms, is most widely known psychological disorders. Sertralin(SERT) and Trazodone (TRAZ) hydrochloride are selective serotonin reuptake inhibitors which are clinically effective for the treatment of depression. The drugs are chemically known as (1S,4S)-4-(3,4dichlorophenyl)-1,2,3,4-tetrahydro-1-naphtyl(methyl) amine and 2- {3-[4-(3-chlorophenyl)-1-piperazin]propyl}-1,2,4-triazolo[4,3-a]pyridin-3-(2H)-one mono hydrochloride [1]. The multivariate calibration techniques use full spectrum, full automation, multivariate data analysis and the reduction of noise and the advantages of the selection calibration model. In addition these multivariate calibrations do not need any separation procedure, they are very cheap, very easy to apply and very sensitive. For these reasons these multivariate techniques are popular today. In this study very powerful chemometric method was applied to analyses the synthetic mixtures and tablets consisting of TRAZ and SERT in the presence of interferences of the absorption spectra. The application of chemometrics allows the interpretation of multivariate data and is vital to the success of the simultaneous determination of the clinical drugs. An accurately weighed pulverized tablets equivalent to 100mg of the studied drugs was extracted with 10mL of Methanol, diluted with water, and sonicated for about 15min. The extracts were filtered into 100mLvolumetric flasks then washed and diluted to volume with distilled water. Aliquots these solutions were transferred into a series of 10mLvolumetric flasks and the analysis were completed as spectrometric procedure. All the techniques were applied to the final solution. A summary of the assay results for the pharmaceutical formulation is given table 1 The results of all methods were very to each other as well as to the label value of commercial drug formulation [2] .

Table 1: Assay results for the pharmaceutical formulation (mg/tablet)

| Drug | ICA-ANN |
|---|---|
| **TRAZ** | |
| **Mean± SD*** | 50.00± 0.12 |
| **SERT** | |
| **Mean± SD*** | 49.56± 1.12 |

Results obtained are average of six experiments for each technique.
*SD : Standard deviation *

● **GUREFE, Yusuf*, AKTURK, Tolga**, PANDIR, Yusuf***,** *Usak University, TURKEY, **Ordu University, TURKEY, ***Bozok University, TURKEY

*An Application of the New Function Method to the Coupled Sine-Gordon Equation*

The aim of this paper is to determine them as convenient as possible to compute the traveling wave solutions including the Jacobi elliptic functions of the coupled sine-Gordon equation by using of the new function method. This method is based on the trial equation $\varphi' = f(\cos\varphi)$. Also, the behaviour of the wave solutions to the coupled sine-Gordon equation are shown via two and three dimensional plots. It can be seen that this approach is effective method for this system.

● **ERSINGUN, Dilan, KERPIC, Ibrahim, ALDEMIR, Adnan,** Yuzuncu Yil University, TURKEY

*Identifying The Hammerstein-Wiener Model for A Liquid Level Control System*

Hammerstein-Wiener models are popular because they have a convenient block representation, transparent relationship to linear systems and are easier to implement than heavy-duty nonlinear models such as neural networks, Volterra models. Nonlinear system identification based on Hammerstein-Wiener model structure which is consists of a linear dynamic block embedded between two nonlinear steady-state blocks, has been processed and synthesized yielding the modeling from only measured inputs and outputs of the dynamic systems. This study proposes to nonlinear Hammerstein-Wiener modeling a liquid level control system by using system identification technique. On-line liquid level experiments were achieved and input/output data obtained from the liquid level control system were process the MATLAB program. Hammerstein-Wiener model orders and four estimator types were applied with the aid of System Identification Toolbox (SIT) of MATLAB. It was observed that the fit values of the piecewise linear estimator type which was calculated for liquid level were higher than that of the dead zone, saturation and one-dimensional polynomial model. According to the results the highest fit values are determined with piecewise linear estimator type which is calculated by 2, 3 and 2 model orders nb, nf and nk, respectively. The best accuracy, loss function and FPE values for liquid level are determined 87.45, 0.249, 0.127, respectively. After determined of the best model order and estimator type for this control system was analyzed and characterized by graphical tools which can be used to design the linear controller, stability analysis, causality, system response analysis and signal processing.

● **OYGUN, Esmanur, KERPIC, Ibrahim, ALDEMIR, Adnan,** Yuzuncu Yil University, TURKEY

*Nonlinear Dynamic Characterization of A Liquid Level Control System*

This work has been carried out to comparison of two types of nonlinear models (wavelet network NARX and sigmoid network NARX) were applied for a liquid level control system that was used for the level control. Experimental input/output data obtained from this system which of the liquid level was selected as the controlled variable and the valve openity was chosen as the manipulated variable. On-line liquid level experiments were achieved and were process the MATLAB program. The two nonlinear models were developed with the aid of System Identification Toolbox of MATLAB using the data acquired from square wave effect between % 10-90 values of the valve openity on the liquid level control system. The model orders used for the estimation of the model coefficients were determined with the aid MATLAB. According to the higher fit value and lower loss function observed in the case of the NARX model developed using wavelet network model has been found to be better than sigmoid network model. In addition, based on the simulation results, these two NARX models getting to the steady-state without any oscillations but wavelet network NARX models were discovered to be better than sigmoid network NARX models due to fastest rise time and fastest response time for this liquid level control system. The best accuracy, loss function and FPE values for this system were determined 89.78, 0.723, 0.667, respectively. Analysis and characterization of this system was carried out by graphical tools which can be used to design the stability analysis, causality, system response analysis and signal processing.

● **ALGIN, Abdullah,** Eskisehir Osmangazi University, TURKEY

*A Deformed Fermion Oscillator Model: Algebra, Fermionic q-Calculus and Thermostatistics*

In this talk, we first present the quantum algeraic properties of a q-deformed fermion oscillator model. We then introduce some properties of the fermionic q-calculus related to the model. Secondly, we discuss the quantum statistical properties of a gas of these q-deformed fermionic oscillators. By means of a q-deformed Fermi-Dirac distribution function, many of the deformed thermostatistical functions such as the chemical potential and the internal energy are derived in the thermodynamical limit. For high temperatures, a virial expansion of the equation of state of the system in three spatial dimensions is obtained, and the first five virial coefficients are derived in terms of the real positive deformation parameter q. On the other hand, in the low-temperature limit, the thermostatistical properties of this deformed Fermi gas model allow us to obtain a q-deformed Sommerfeld parameter for the deformed electronic heat capacity of the model. This gives rise to find out a remarkable relation between the effective mass of a deformed (or quasi) fermion and the model deformation parameter. Therefore, all the thermostatistical results reveal that the present deformed fermion model can be used to understand deeply the nature of effective interactions among quasiparticles encountered in condensed matter systems.
Acknowledgements : This study is supported by the Scientific and Technological Research Council of Turkey (TUBITAK) under the Project No: 113F226.

● **ALIPOUR, Mohsen,** Babol Noshirvani University of Technology, IRAN

*Numerical Investigation on Fractional Variational Problems Depending on Indefinite Integrals*

In this paper, we solve the dynamical fractional variational problems depending on indefinite integrals. The Bernstein operational matrices were applied to obtain the approximate analytical solution of this problem. In this way, the model is reduced to an algebraic easily solvable system. The obtained solutions are very accuracy and the method is very efficient and simple in implementation.

● **ALLAHVERDI, Ali*, AYDILEK, Harun**, AYDILEK, Asiye**, ***Kuwait University, KUWAIT, **Gulf University for Science and Technology, KUWAIT

*No-Wait Flowshop Scheduling Problem with Both Makespan and Mean Completion Times*

The m-machine no-wait flowshop scheduling problem is investigated with respect to two criteria. The objective is to minimize makespan such that mean completion time is less than a certain value. A dominance relation is provided for a special case of the problem, and two new algorithms are presented for the general problem. Extensive computational analysis are conducted to evaluate the perfor-mance of the newly proposed two algorithms. The analysis shows that one of the proposed algorithms (eSA) reduces the error of the previously best known algorithm for the problem (HH1) by more than two-thirds while the computational time of HH1 is one-third more than that of eSA. Furthermore, the computational analysis also shows that the other proposed algorithm (eHH) reduces the error of HH1 by more than three-thirds while both eHH and HH1 have the same computational time. All the results have been statistically verified.

● **ALLAOUA, Boudjedour, MOHAMED, Dalah,** Freres Mentouri Constantine University, ALGERIA

*Electro-Viscoelastic Antiplan Contact Problem with Regularized Friction Law*

Purpose: In this work we study a mathematical problem modelling the antiplane shear deformation of a viscoelastic body in frictional contact with a rigid foundation. First, we assume that the contact is modelled with a regularized friction law. We present the classical formulation for the antiplane problem and write the corresponding variational formulation. Then we establish the existence of a unique weak solution to the model.

● **ALMESBAHI, Manal Mastafa,** Atilim University, TURKEY

*On the q-Bernstein Operators*

The $q$-Bernstein polynomials have gained popularity during the last decades. They attracted attention of many researchers who investigated them from different points of view. In this talk, new results on the $q$-Bernstein operators related to the behavior of iterates and dependence on $q$ will be presented. In particular, it is shown that $q$-Bernstein polynomials generate weakly Picard operators for all $q > 0$.

● **ALREFAEI, Mahmoud,** Jordan University of Science and Technology, JORDAN

*Fully Fuzzy Linear Programming*

We consider the linear programming (LP) problem at which all parameters and variables involved in the problem are fuzzy. In the traditional approach, values of the parameters of LP models are well defined and precise. However, in real life problems, there may be no accurate information about the parameters; therefore, the fuzzy numbers may be used in this regard. We consider the fully fuzzy linear programming (FFLP) problem at which all parameters and variables are assumed to be fuzzy. In this paper the trapezoidal FFLP is solved by converting it into crisp LP (CLP), then the simplex method is used to solve this CLP; the solution then is converted to fuzzy solution. Moreover, the duality of FFLP will be discussed and the Dual Simplex Method will be used for solving the FFLP problem. Finally, some sensitivity analysis of FFLP will be studied too.

● **AL-REFAI, Mohammed*, ABDELJAWAD, Thabet**,** *UAE University, UAE, **Prince Sultan University, SAUDI ARABIA

*Analysis of the Fractional Diffusion Equations with Fractional Derivative of Non-Singular Kernel*

In this paper we study linear and nonlinear fractional diffusion equations. We consider the Caputo fractional derivative of non-singular kernel that has been launched recently [2]. We first obtain an estimate of the fractional derivative of a function at its extreme points. We then derive simple and strong maximum principles for the linear fractional equations. These principles are implemented to establish uniqueness and stability results for the linear and non-linear fractional initial-boundary value problems, and to obtain a norm estimate of the solution. The obtained strong maximum principles are comparable with the ones for the diffusion equations with integer derivatives, and they have not been obtained by any other type of fractional derivatives. The results will also be discussed for the fractional diffusion equations with several types of fractional derivatives of singular kernel, see [1].

● **AL-SHARIF, Sharifa , MALKAWI, A. ,** Yarmouk University, JORDAN

*New Generalization of Conformable Fractional Derivative with Classical Properties*

In this paper, a new generalization fractional derivative that uses limit approach with classical properties, linearity, product rule, semi-chain rule, quotient rule, ets... is presented. Also we prove that such generalization formula does not satisfy the classical chain rule.

● **ALSOY-AKGUN, Nagehan,** Yuzuncu Yil University, TURKEY

*Drbem Solution of Natural Convection Flow of Nanofluid Under A Uniform Magnetic Field*

A numerical investigation is given for unsteady natural convection flow of $Al_2O_3$ −water based nanofluids which is influenced by a magnetic field. Dual Reciprocity Boundary Element Method (DRBEM) is used to solve stream function-vorticity form of the governing equations of the problem. The need of time integration scheme is eliminated by transforming the vorticity transport and energy equations to modified Helmholtz equations. This procedure also diminish the stability problems. The resulting modified Helmholtz equations are solved

by DRBEM using the fundamental solution $\frac{1}{2\pi}K_0(x)$ whereas in the stream function Poisson's equation $\frac{1}{2\pi}\ln(x)$ is made use of. The solution procedure needs considerably small number of iterations and large time increments with suitable values of relaxation parameters which occur in the argument of Bessel function $K_0(x)$. The inhomogeneities are approximated by using coordinate functions $f = 1 + r$ and $f = r^2 \ln r$ in the stream function and vorticity-energy equations, respectively, and the missing vorticity boundary conditions are also obtained with the help of coordinate matrix F. The numerical results are given for several values of Rayleigh number, Hatrmann number and solid volume fraction. The steady-state results are in good agreement with the results available in the literature.

● **ALTINOK, Hifsi, ET, Mikail, ALTIN, Yavuz,** Firat University, TURKEY

*Lacunary Statistical Boundedness of Order β of Sequences of Fuzzy Numbers*

In this study, we introduce the concept of lacunary statistical boundedness of order $\beta$ for sequences of fuzzy numbers and give some relations between lacunary statistical boundedness of order $\beta$ and statistical boundedness.

● **ALTINOK, Maya, KUCUKASLAN, Mehmet,** Mersin University, TURKEY

*Strongly Porous Subsets of $\mathbb{N}$ at Infinity*

In this paper, we will define a new strong porosity at infinity with respect to $\tilde{\gamma} = \{\gamma_n\}_{n\in\mathbb{N}}$, $\gamma_n \in \mathbb{N}$ for all $n \in \mathbb{N}$, for subsets of natural numbers by using an equivalence relation. Then we will give some properties of this new concept. Also, we will give some examples. Finally, we will obtain a characterization for strongly porous subsets of natural numbers at infinity by using this new $\tilde{\gamma}$-strongly porosity.
Acknowledgments : Authors are thankful for the support of the Mersin University Scientific Research Project, Project Code: 2016-2-TP3-1921.

● **ALTUN, Ishak*, DURMAZ, Gonca**, OLGUN, Murat***, MINAK, Gulhan*,** *Kirikkale University, TURKEY, **Cankiri Karatekin University, TURKEY, ***Ankara University, TURKEY

*New Fixed Point Results for P-Contractive Mappings on Metric Spaces*

In this talk we introduce a new concept of P-contractive mapping on metric space. Then we claim that every contractive mapping is also P-contractive but the converse may not be true in general. We provide an example illustrating this fact. Also, we provide some examples showing that nonexpensive mappings and P-contractive mappings are independent on metric spaces. Finally, we present that every continuous P-contractive mapping on compact metric space has a unique fixed point. This result includes the famous Edelstein fixed point theorem as properly.

● **OLGUN, M.*, ALYILDIZ, Tugce*, BICER, O.*, ALTUN, I.**,** *Ankara University, TURKEY, **Kirikkale University, TURKEY

*Fixed Point Results for F-Contractions on Space with Two Metrics*

In this paper, taking into account two metrics on a space, we present a new fixed point theorem for F-contractions. Our theorem includes both Agarwal and O'Regan's and Wardowski's results as properly. Also we provide a nontrivial example showing this fact.

● **HDEIB, Hassan Z.*, AL-ZOUBI, Khalid Y.**, ***University of Jordan, JORDAN**, ****Yarmouk University, JORDAN

*A Note on Locally Paracompact and Locally Metacompact Spaces*

In this paper, some fundamental properties of locally paracompact spaces are given. Also, we introduce and investigate a new class of spaces called locally metacompact spaces.

● **MASJED-JAMEI, M. , SOLEYMAN, F. , AREA, I. , NIETO, J. J. ,** Universidade de Vigo, SPAIN

*On (p,q)-Classical Orthogonal Polynomials and Their Characterization Theorems*

In this talk, we introduce a general $(\mathrm{p},\mathrm{q})$ −Sturm-Liouville difference equation whose solutions are $(\mathrm{p},\mathrm{q})$ −analogues of classical orthogonal polynomials leading to Jacobi, Laguerre and Hermite polynomials as $(\mathrm{p},\mathrm{q}) \longrightarrow (1,1)$. In this direction, some basic characterization theorems for the introduced $(\mathrm{p},\mathrm{q})$ −Sturm-Liouville difference equation, such as Rodrigues representation for the solution of the aforesaid difference equation, a general three-term recurrence relation and a structure relation for the $(\mathrm{p},\mathrm{q})$ −classical polynomial solutions are given.

● **ARIKAN, Feza*, ARIKAN, Orhan**, SEZEN, Umut*, ***Hacettepe University, TURKEY, **Bilkent University, TURKEY

*Dynamo Equation Solution Using Finite Volume Method for Midlatitude Ionosphere*

Ionosphere is the layer of atmosphere which plays an important role both in space based navigation, positioning and communication systems and HF signals. The structure of the electron density is a function of spatio-temporal variables. The electrodynamic medium is also influenced with earth’s magnetic field, atmos-pheric chemistry and plasma flow and diffusion under earth’s gravitation. Thus, the unified dynamo equation for the ionosphere is a second order partial differential equation for quasi-static electric potential with variable spatial coefficients. In this study, the inhomogeneous and anisotropic nature of ionosphere that can be formu-lated as a divergence equation is solved numerically using Finite Volume Method for the first time. The ionosphere and the operators are discretized for the midlatitude region and the solution domain is investigated for Dirichlet, Neumann and Cauchy type boundary conditions. The analysis indicates that FVM can be a powerful tool in obtaining parametric electrostatic potential distribution in ionosphere.

● **ARSHAD, Sadia,** Chinese Academy of Sciences, CHINA

*Dynamics of Cancerous Tumor model of Fractional Order*

In this paper, we concentrate on fractional order model of tumor growth. We investigate the dynamics of the model that incorporates the interactions among tumor cells, immune cells and normal cells. We established a sufficient condition for existence and uniqueness of the solution of the fractional order tumor growth model. Local stability of the four equilibrium points of the model, namely the tumor free equilibrium, the dead equilibrium of type 1, the dead equilibrium of type 2 and the coexisting equilibrium is investigated by applying Matignons condition. Dynamics of the fractional order tumor model is numerically investigated by varying the fractional-order $q \in (0, 1]$ and the system parameters.

● **ASAR, Yasin***, **YUZBASI, Bahadir****, *Necmettin Erbakan University, TURKEY, **Inonu University, TURKEY

*Linear Unified Shrinkage Estimators in Linear Models*

In this study, we consider a linear regression model ($Y = X\beta + \varepsilon$) under the assumption of sparsity. Under this assumption, the vector of coefficients $\beta$ can be partitioned as $(\beta_1, \beta_2)$ where $\beta_1$ is the coefficient vector for main effects, and $\beta_2$ is the vector for nuisance effects or insignificant coefficients. We are essentially interested in the estimation of $\beta_1$ when it is reasonable that $\beta_2$ is close to zero. The full model estimation may be subject to high variability and may not be easily interpretable. On the other hand, a sub-model strategy may result with an under-fitted model with large bias. For this reason, we consider pretest and shrinkage strategy to control the magnitude of the bias. A detailed definition of shrinkage estimation is given, and large sample estimation techniques is discussed in a regression model in [1]. For more recent work on the subject, we refer to [2] and [3] . In this study, we present the preliminary test, Stein-type and positive part Liu [4] estimators in a multiple linear models. Therefore, we conduct a Monte Carlo simulation study to evaluate the relative efficiency of the suggested estimators, where we demonstrate the superiority of the proposed estimators.

● **ASLAN, Hatice***, **ISMAIL, Mourad E. H.****, *Firat University, TURKEY, **University of Central Florida, USA

*A Continuous Analogue of the Bernstein Polynomials*

In the present paper, we introduce a new positive linear operator and give some approximation properties of this operator. We also find the order of aproximation and give the Voronovskaya-type theorem. We also find the eigenvalues of the restriction of our operator and general exponential operator with quadratic variance to the space of polynomials of degree at most.

● **ASLANTAS, Mustafa***,**, **TURAN, Bahri****, *Karabuk University, TURKEY, **Gazi University, TURKEY

*A Frobenius Gelfand-Mazur Type Theorem on b-Algebras*

Huijsmans gave that an Archimedian f-algebras with unit element e>0 in which every positive element has a positive inverse is lattice- and algebra-isomorphic to reals [1]. On the other hand, Scheffold showed that if every positive element has an inverse in type-1 real Banach lattice algebra with unit element e>0 then it is isomorphic to reals [2]. After that, we introduce the Notion of b-algebras and we give some related properties. To be more pricese, we call a b-algebra any lattice-ordered algebra A the bands of which are closed under multilication. We obtain that a set A can be idendified with the reals whenever A is an Archimedian b-algebras with unit element e>0 and such that every positive element has an inverse. This improves a result by Huijsmans who got the same conclusion for f-algebras imposing the extra condition of positivity of inverses [3].

● **ASLIYUCE, Serkan, GUVENILIR, A. Feza**, Ankara University, TURKEY

*Chebyshev's Inequality with Fractional Summation Operator*

In this presentation, we will show discrete fractional analogue of Chebyshev's inequality.

● **ASSIA, Guezane-Lakoud, R. , Khaldi,** Badji Mokhtar Annaba University, ALGERIA

*Existence of Solutions for a Nonlinear Higher Order Fractional Differential Equation*

We prove new results regarding the existence of solutions for a nonlinear higher order fractional differential equation involving both the left Riemann-Liouville and the right Caputo fractional derivatives with a natural boundary condition. The study is based on the upper and lower solutions method and on the monotonicity of the right Caputo derivative. Moreover we give the explicit expression of the lower and upper solutions.

● **ATANGANA, Abdon,** University of Free State, SOUTH AFRICA

*Modelling Groundwater Fractal Flow with Fractional Differentiation via Mittag-Leffler Law*

Modelling the flow of groundwater within a network of fracture is perhaps one of the most difficult exercises within the field of hydrology. This physical problem has attracted attentions of several scientists across the globe. Already two different types of differentiations have been used to attempt modelling this problem including the classical and the fractional differentiation. In this paper, we employed the most recent concept of differentiation based on the non-local and non-singular kernel called the generalized Mittag-Leffler function, to reshape the model of groundwater fractal flow. We present the existence of positive solution of the new model. Using the fixed-point approach, we established the uniqueness of the positive solution. We solve the new model with three different numerical scheme including implicit, explicit and Crank-Nicholson schemes. Experimental data collected from four different settlements are compared with the numerical solutions.

● **ATCEKEN, Mehmet*, YILDIRIM, Umit*, DIRIK, Suleyman**,** *Gaziosmanpasa University, TURKEY, **Amasya University, TURKEY

*On the Quasi Conformal Curvature Tensor of a Normal Paracontact Metric Manifold*

In the present paper we have studied the curvature tensor of a normal paracontact metric manifold satisfying the conditions $R(\xi,X)\tilde{C}=0$, $\tilde{C}(\xi,X)S=0$, $\tilde{C}(\xi,X)P=0$, $\tilde{C}(\xi,X)\tilde{Z}=0$ and pseudo quasi conformal flat where $R$ is Riemannian curvature tensor, $S$ is Ricci tensor, $P$ is projective curvature tensor, $\tilde{Z}$ is concircular curvature tensor and $\tilde{C}$ is pseudo quasi conformal curvature tensor.

● **ATES**, **Esma*, INC, Mustafa**,** *Karadeniz Technical University, TURKEY, **Firat University, TURKEY

*Exact Soliton Solutions for the Klein-Gordon-Schrödinger Equation with Power Law Nonlinearity*

This study focuses on 1-soliton solutions of nonlinear Klein-Gordon-Schrödinger (KGS) equation which appears in Modern Physics. In this paper, Jacobi elliptic functions will be used to carry out the integration of the KGS equation with power law nonlinearity. This equation describes the classical model of interaction of a nucleon field with a meson field. Jacobi elliptic function solutions and also bright, dark and singular soliton solutions are also obtained for KGS equation using three types of Jacobi elliptic functions in this study. Furthermore, we will acquire constraint conditions for the existence of obtained solitons.

● **AUWALU, Abba,** Near East University, NORTH CYPRUS

*Strong Convergence of an Iterative Process for a Family of Strictly Pseudocontractive Mappings in q-Uniformly Smooth Banach space*

We generalize the iterative process and extend the results of Qing, Cho and Shang (Fixed Point Theory Appl. 2013:117, 2013) to a real $q$-uniformly smooth Banach space as follows:
Let $K$ be a nonempty closed convex subset of a real $q$-uniformly smooth Banach space $E(q>1)$ and let $\{T_i\}_{i=1}^{\infty}: K\to K$ be a family of $k_i$-strictly pseudocontractive mappings for some $0\le k_i<1$ such that $\cap_{i=1}^{\infty}F(T_i)\neq\emptyset$, $f$ be a contraction with a constant $\alpha\in(0,1)$. Define a mapping $S_n x:=(1-\gamma_n)x+\gamma_n T_n x, \forall x\in C$ and $n\ge 1$. Let $\{x_n\}$ be a sequence defined by

$$\begin{cases} x_1 \in K \text{ arbitrarily chosen,} \\ y_n=\beta_n x_n+(1-\beta_n)\sum_{i=1}^{\infty}\lambda_i T_i x_n, \\ x_{n+1}=\alpha_n f(y_n)+(1-\alpha_n)S_n y_n, \quad n\ge 1, \end{cases}$$

where $\{\alpha_n\}$, $\{\beta_n\}$, $\{\gamma_n\}$ and $\{\lambda_i\}$ are sequences in $(0,1)$ satisfying some mild conditions. Then, we prove that $\{x_n\}$ converges strongly to a common fixed point $x^*$ of the family $\{T_i\}_{i=1}^{\infty}$, which uniquely solves the variational inequality:

$$\langle (f-I)x^*, j_q(x-x^*)\rangle\le 0, \forall x\in \cap_{i=1}^{\infty}F(T_i).$$

● **AVCI, Derya,** Balikesir University, TURKEY

*Diffusive Stresses based on A Conformable Advection-Diffusion Equation*

In this paper, Cauchy and source problems based on a conformable advection-diffusion equation are considered. Mathematically, the diffusion coefficient and velocity field are assumed as time-dependent functions and then the constitutive equation is clearly obtained in terms of conformable derivative with fractional order. In addition, time-dependent diffusion coefficients clarify the causes of anomalous diffusion from the physical point of view. To get the fundamental solutions, fractional Laplace and exponential Fourier transforms are applied. Furthermore, the corresponding diffusive stresses are computed by using classical theory of elasticity.

● **IRK, Dursun, AY, Buket, SAKA, Bulent,** Eskisehir Osmangazi University, TURKEY

*Quartic B-spline Galerkin Method for the Advection Diffusion Equation*

We consider the following one dimensional advection diffusion equation in a restricted solution domain over a space/time interval [a, b] × [0, T]

$$u_t + \alpha u_x - \mu u_{xx} = 0, \tag{1}$$

with the initial condition

$$u(x,0) = f(x), \tag{2}$$

and the boundary conditions

$$u(a,t) = u(b,t) = u_x(a,t) = u_x(b,t) = 0. \tag{3}$$

Various numerical techniques have been developed and compared for solving the one dimensional advection-diffusion equation with constant coefficient so far [1], [2], [3], [4]. In this study, quartic B-spline Galerkin finite element method, based on second and fourth order single step methods for time integration is proposed for numerical solution of the advection diffusion equation. Two numerical examples are studied to illustrate the accuracy and the efficiency of the method. The numerical results of this study demonstrate that the proposed fourth order single step method is a remarkably successful numerical technique for solving the advection-diffusion equation.

● **AYAZ, Fatma, GORGULU, Onur, BEKTAS, Irem, ENVER, Aytekin,** Gazi University, TURKEY

*A Numerical Approach for Solving Multi Term Fractional Order Differential Equations*

Due to well describing some naturel physical processes and dynamical systems as mathematical models, fractional order equations have become popular today and attracted many researchers' attention. Finding solution to these equations is an important issue and usually, analytical solutions can not be obtained easily. Therefore, there is need to develop some powerful numerical techniques. In this paper, we investigate the numerical solution of some particular types of fractional order multi term differential equations. There are some suggested numerical algorithms for these equations but they usually involve a single term and the order of the equation is less then one. Here, we present a hybrid method.in which the fractional order derivative is written in terms of Riemann Liouville integral and this integral is

evaluated as Hadamard finite-part integral numerically as in [1]. On the other hand, the other ordinary derivatives are discretized in terms of standard finite difference approximation. In this study, error estimate has been dealt with and reliability and convergency of the method are tested on some illustrative examples.

● **AYDEMIR, Kadriye*, SH. MUKHTAROV, Oktay**,***, OLGAR, Hayati**,** *****Amasya University, TURKEY, ******Gaziosmanpasa University, TURKEY, ***Azerbaijan National Academy of Sciences, AZERBAIJAN

*A Note on Discontinuous Sturm-Liouville Problems with Interface Conditions*

The purpose of this paper is to extend some spectral properties of regular Sturm-Liouville problems to the special type discontinuous boundary-value problem, which consist of a Sturm-Liouville equation together with boundary and transmission conditions. We construct the resolvent operator and Green's function and prove theorems about eigenvalues and corresponding eigenfunctions in direct sum of Hilbert spaces.

● **AYDIN, Cemre, TEZER-SEZGIN, M. ,** Middle East Technical University, TURKEY

*DRBEM Solution of the Cauchy Problem for MHD Rectangular Duct Flow*

This study presents MHD rectangular duct flow as a Cauchy problem with overdetermined and underdetermined conditions on the opposite parts of the duct walls. The governing coupled convection-diffusion type equations are solved using the dual reciprocity boundary element method (DRBEM). The problem is reformulated as an inverse problem by using the direct solution and solved with Tikhonov regularization. The optimal parameter is computed from the L-curve procedure including noisy data to the overdetermined conditions. Both cases of insulated and conducting vertical walls are considered for obtaining the slip velocity and conducting current on the underdetermined wall. It is found, as Hartmann number increases slip velocity is observed as a secondary flow and the current conductivity is clearly seen on the left vertical wall. The DRBEM has the advantage of computing the solution and its normal derivative on the boundary which makes possible to determine slip length and conductivity parameter from inverse formulation.

● **AYDOGAN, Melike,** Isik University, TURKEY

*Two High-Order Fractional Differential Equations by Using the Capotu-Fabrizio Derivative*

In this talk, we investigate the existence of solutions of two high-order fractional differential equations including the Capotu-Fabrizio derivative. In this way, we shall use a new method for solving the high-order equations.

● **AYDOGMUS, Fatma*, TOSYALI, Eren**,** *Istanbul University, TURKEY, **Istanbul Bilgi University, TURKEY

*A Numerical Study on the 2D Nonlinear Fermionic Model*

In this paper, the dynamical nature of 2D nonlinear fermionic Thirring model which describes Dirac fermions in (1+1) space-time dimensions with local current-current interaction is studied by constructing phase space displays depending on the excitation amplitude of the

external forcing and its frequency and damping term to understand how the regular behaviours of Thirring solutions could be affected by forcing and damping.

● **BAYRAM, Elgiz, AYGAR, Yelda,** Ankara University, TURKEY

*Scattering Solution of Impulsive Sturm-Liouville Equation in Quantum Calculus*

Let us consider a boundary value problem (BVP) for an impulsive quantum Sturm-Liouville equation.

$$qa(t)y(qt) + b(t)y(t) + a\left(\frac{t}{q}\right)y\left(\frac{t}{q}\right) = \lambda y(t)$$

$$y(1) = 0$$

$$y(q^{m_0+1}) = \gamma_1 y(q^{m_0-1})$$

$$y(q^{m_0+2}) = \gamma_1 y(q^{m_0-2})$$

*where* $t \in q^{\mathbb{N}_0 \setminus \{m_0-1,\, m_0,\, m_0+1\}} = \{1, q, \dots, q^{m_0-2}, q^{m_0+2}, \dots\}$.

The aim of this study is to find Jost solution and scattering function of an impulsive quantum Sturm-Liouville equation. Moreover, we investigate the properties of Jost solution and scattering function of this BVP.

● **AYRIM, Yelda, CAN, Gulin F. ,** Baskent University, TURKEY

*A Mathematical Modelling for Determining Job Rotation Strategy Considering Mental and Physical Fatique*

Job rotation is a type of work organization that provides the ability for doing more than one jobs for workers by directed those to different works at certain times of a working day. Mental and physical fatigue occurred on workers by high repetitive, needing attention and monotonous jobs are prevented with job rotation. By determining appropriate job rotation strategy, worker's productivity increase, company's production quantity and profitability are also increase. In this study, optimal job rotation strategy is attempted to determine by using mathematical model that aims the maximization of the production quantity in addition to reduce mental and physical fatigue. The mixed integer programming model is used for mathematical model. OWAS (Ovako Working Posture Analysis System) and NASA TLX (National Aeronautics and Space Administration Task Load Index) approaches are used to evaluate mental and physical fatigue respectively. Moreover, performance changes among workers are also considered in the proposed model.

● **AYYILDIZ, Ezgi, PURUTCUOGLU, Vilda,** Middle East Technical University, TURKEY

*Modeling of Various Biological Networks via LCMARS*

The Conic Multivariate Adaptive Regression Splines (CMARS) is one of the recent nonparametric methods developed for high dimensinal and correlated data. This model is suggested to improve the performance of the MARS approach which is a complex model

under the generalized additive models. From previous studies, it has been shown that MARS can be a promising model for the description of steady-state activations of biological networks if it is modified as a lasso-type regression via the main effects. In this study, we convert the full description of CMARS as a lasso expression, so-called LCMARS, by including both main and second-order interaction effects since this description has performed better in benchmark real datasets. Whereas, a comprehensive analysis based on distinct distributions and dimensions has not been assessed yet. Here, we generate various scenarios for LCMARS and evaluate the performance of accuracy as well as computational demand via Monte Carlo runs.
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● **BABADAG, Faik,** Kirikkale University, TURKEY

*Dual Homothetic Exponential Motions with Dual Tessarines*

In this paper, by considering the dual tessarines, we describe a detailed study of dual homothetic exponential motion. To do this, we describe a variety of algebraic properties of dual tessarines and give a dual matrix that is similar to Hamilton operators and a new dual exponential motion is defined by this matrix. Then, this dual exponential motion is proven to be dual homothetic exponential motion. For this one parameter dual homothetic exponential motion, we defined some theorems about dual velocities, dual pole points, and dual pole curves. Finally, It is found that this dual exponential motion defined by the dual regular curve of order n dual curve lying curves on the hypersurface M, at every t- instant, has only one dual acceleration centre of order (n-1). Due to the way in which the matter is given with dual tessarines, the study gives some formulas, facts and properties about dual homothetic exponential motion and variety of algebraic properties which are not generally known.

● **BALEANU, Dumitru,** Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*Fractional Calculus and Non-Locality*

In this talk I will discussed the new trends in fractional calculus and its applications in order to describe better the non-local dynamical systems.

● **RAZMINIA, Abolhassan*, BALEANU, Dumitru**,** *Persian Gulf University, IRAN, ******Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*On Fractional Order Performance Index in Optimal Control Problems*

This paper addesess a new view to the optimal control problems in a more realistic perspective. As a matter of fact, using fractional order integration, a time-weighted performance index can be introduced for evaluating the performance of optimal control problems. Such formulation are gained in the light of intrinsic kernel in the definition of the Riemann-Liouville fractional order integral which wieghs the Lagrangian of the perfromance index upon the time progresses. This issue is supported by an illustrative example.

● **RAZMINIA, Abolhassan*, BALEANU, Dumitru**,** *Persian Gulf University, IRAN, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*Optimal Control of a CSTR Process with Frequency Domain Evaluation*

The aim of this manuscript is presenting an optimal controller design technique for a continuous stirred tank reactor (CSTR) in the frequency domain. Indeed, an optimal regulator problem over an infinite time horizon is solved whose formulation is carried out in the frequency context. In practical engineering problems, the presence of harmonic components of some specified frequencies in some state and/or control variables, must be avoided, or, equivalently, suitable penalties on them must be set. The frquency approach analysis of such optimal control problem is a fair way which considered in this paper. An illustrative example for a CSTR process shows the effectiveness of the presented method, even in the presence of external disturbances.

● **BAS, Erdal, OZARSLAN, Ramazan,** Firat University, TURKEY

*Analysis of Sturm-Liouville Difference Equation via Delta Calculus*

In this study, we reconsider Sturm-Liouville difference equation, which has been already found the representation of solution [1,2], by means of delta exponential function, which is discrete analogue of exponential function $e^{pt}$, $p \in \mathbb{R}$, in the continuous calculus. Delta exponential function is defined in the set of regressive functions $\Re = \{p : \mathbb{N}_a \to \mathbb{R} \; such\; that \; 1 + p(t) \neq 0 \; for \; t \in \mathbb{N}_a\}$. Then, let's give the definition of delta exponential function. Assume that $p \in \Re$ and $s \in \mathbb{N}_a$, [4]

$$e_p(t,s) = \begin{cases} \prod_{\tau=s}^{t-1}(1+p(\tau)) \;, & \tau \in \mathbb{N}_s \\ \prod_{\tau=t}^{s-1}(1+p(\tau))^{-1}, & t \in \mathbb{N}_a^{s-1} \end{cases}.$$

Starting from this, it is found linearly independent solutions for homogen part of Sturm-Liouville difference equation with Dirichlet boundary conditions [2]. By the means of characteristic equation, it is seen that characteristic roots are complex pair, so homogen solutions can be written in terms of delta trigonometric and delta exponential functions [4]. Consequently, the representation of solution for Sturm- Liouville difference equation, previously obtained in [1,2], is reacquired from a different viewpoint by delta calculus [3,4].

● **AYGAR, Yelda, BAYRAM, Elgiz,** Ankara University, TURKEY

*Spectral Analysis of the Quadratic Pencil of Schrödinger Equation with a General Boundary Condition*

In this work, we investigate the eigenvalues and spectral singularities of a boundary value problem (BVP)

$$-y'' + [q(x) + 2\lambda p(x) - \lambda^2 y]y \quad = 0, \qquad x \in [0,\infty]$$

$$\int_0^\infty K(x)y(x)\,dx + \alpha y'(0) - \beta y(0) = 0,$$

where $p, q \; and \; K$ are complex valued functions. The results about the spectrum of this BVP are applied to the Klein-Gordon and Schrödinger equations.

● **MERDAN, Mehmet*, BEKIRYAZICI, Zafer**, KESEMEN, Tulay***,** *Gumushane University, TURKEY, **Recep Tayyip Erdogan University, TURKEY, ***Karadeniz Technical University, TURKEY

*Analysing the Early–Stage Dynamics of a Model for Ebola Virus Under Random Effects*

Recently, a SIR-type based deterministic compartmental model has been developed to analyse the transmission dynamics of the Ebola Virus in Africa. In this study, this mathematical model of Ebola Virus is analysed under random conditions. The parameters of the deterministic equation system are assumed to be random variables with Gaussian Distribution. The resulting random model, consisting of random differential equations, is analysed to obtain the moment formulas for the initial days of the disease. Approximate formulas for the moments are obtained by using Differential Transform Method and are compared with the results of the deterministic model and the simulations of the random model to comment on the random behaviour of the disease.

● **BENKACI ALI, Nadir,** University M'Hmed Bouguerra, ALGERIA

*Positive Pseudo-Symmetric Solutions for a Three Point Boundary Value Problem Involving a Generalized p(t)-Laplacian Operator*

Under suitable conditions and via fixed point index theorems, we provide existence results for a pseudo-symetric positive solution for the following three-point boundary-value problem having a two dimensional Φ-Laplacian operator

$$-\left(\Phi\left(x,,u'(x)\right)\right)' = f\left(x,u(x)\right),\ \ x\ \in\ (0,1),$$
$$u(0) = \alpha u(\eta_0)\ ,\ \ u(1) = u(\eta)\ ,$$

where $0 \leq \eta_0 \leq \eta < 1$ , $\alpha\ \in [0,1[$, $\Phi : [0,1] \times \mathbb{R} \to \mathbb{R}$ is continuous such that, the functions $t\ \to \Phi(t,.)$ and $t\ \to f(t,.)$ are pseudo-symmetric about $\eta\ in\ [0,1]$, $x\ \to \Phi(.,x)$ is an homeomorphism, increasing and odd in $\mathbb{R}$ , and $f\ \in C([0,1] \times \mathbb{R}^+, \mathbb{R}^+)$.

● **BHAT, Altaf A. , JAIN, D. K. , JAIN, Renu,** Jiwaji University, INDIA

*Dirichlet Averages of Wright-Type Hypergeometric Function and Their q-Extension*

In the present paper, the authors approach is based on the use of Dirichlet averages of the generalized Wright-type hypergeometric function introduced by Wright in like the functions of the Mittag-Leffler type, the functions of the Wright type are known to play fundamental roles in various applications of the fractional calculus. This is mainly due to the fact that they are interrelated with the Mittag-Leffler functions through Laplace and Fourier transformations.

● **BILGILI GUNGOR, Nurcan**, Amasya University, TURKEY

*Remarks on Soft G-Metric Spaces and Fixed Point Theorems*

In this paper, we will define soft quasi-metric spaces via soft element. Also we investigate the presented notion of soft G-metric spaces and the fixed point existing results of contractive mappings defined on this kind of spaces. Especially, we indicate that the most gotten fixed point theorems on this kind of spaces can be concluded directly from fixed point theorems on soft metric or soft quasi-metric spaces.

● **BIN OSMAN, Mohd H.*,**, KAEWUNRUEN, Sakdirat**, JACK, Anson***, ***University of Birmingham, UNITED KINGDOM, **Universiti Kebangsaan Malaysia, MALAYSIA

*Rescheduling Periodic Rail Track Inspection Schedule Based on Cost-Benefit Analysis*

Track inspection vehicles perform thousands of kilometres of journeys in a single year of inspection schedule. Due to the fact that inspection vehicles are still fuel-powered machines, the on-board inspection style becomes an active contributor to rail carbon footprint. A straightforward way to make it environmentally-friendly is to reduce the size of the prescribed (master) periodic inspection schedule but it is challenging as track safety might be compromised. In this paper, we propose rescheduling methods that enable varied levels of adjustment to the prescribed schedule in a way to turn visual inspection going green while ensuring track safety risk levels is maintained as low as reasonably practicable. Monte Carlo simulations demonstrated that different settings of a cost-benefit model affected different parts of the prescribed periodic inspection schedule. Overall, the idea of rescheduling is a promising strategy for reducing total number inspection while gaining unexpected cost savings including carbon print reductions.

● **MURESAN, Cristina I.*, DE KEYSER, Robin**, BIRS, Isabela R.*, FOLEA, Silviu*, PRODAN, Ovidiu*****, *Technical University of Cluj-Napoca, ROMANIA, **Ghent University, BELGIUM, ***Technical University, ROMANIA

*An Autotuning Method for a Fractional Order PD Controller for Vibration Suppression*

Fractional order controllers are receiving an ever-increasing interest from the research community due to their advantages. However, most of the tuning procedures for fractional order controllers assume a fully known mathematical model of the process. In this paper, an autotuning method for the design of a fractional order PD controller is presented and applied to the vibration suppression in airplane wings. To validate the designed controller, an experimental unit consisting of a smart beam that simulates the behaviour of an airplane wing is used. The experimental results demonstrate the efficiency of the designed controller in suppressing unwanted vibrations.

● **BODUR, Murat*, TASDELEN, Fatma*, ARAL, Ali**, ***Ankara University, TURKEY, **Kirikkale University, TURKEY

*A Generalization of Lupaş-Jain Operators*

The aim of this paper is to construct the generalization of Lupaş-Jain operators. Also, we demonstrate the fact that these operators are non-increasing in n providing that the original function is convex and the rate of Lipschitz continuous function. Furthermore, we investigate the weighted uniform approximation results, as well. Finally, we discuss the rate of approximation in weighted spaces.

● **BOUKRIOUA, Souida*, SAIDI, Abdelkader**, ***University of Ouargla, ALGERIA, **Universit de Strasbourg, FRANCE

*Bilateral Contact Problem with Adhesion Between Two Bodies for Viscoelastic with Long-Term Memory and Damage*

We consider a quasistatic contact problem between two viscoelastic bodies with long-term memory and damage. The contact is bilateral and the tangential shear due to the bonding field is included. The adhesion of the contact surfaces is taken into account and modelled by a surface variable, the bonding field. We prove the existence of a unique weak solution to the problem. The proof is based on arguments of time-dependent variational inequalities, parabolic inequalities, differential equations and fixed point.

● **BRZDEK, Janusz,** Pedagogical University of Cracow, POLLAND

*Fixed Point Results Motivated by Ulam Stability*

S. Ulam asked some questions concerning stability of various mathematical objects. In particular, in 1960 he raised the following problem: When is it true that the solution of an equation differing slightly from a given one, must of necessity be close to the solution of the given equation? Such questions stimulated a long lasting research activities and motivated several fixed point results for function spaces. We will present them and show some of their applications. In particular, generalizations of the classical Banach and Matkowski Theorems will be discussed.

● **BUGATEKIN, Ayse T. ,** Firat University, TURKEY

*Reliability of Consecutive k-out-of-n Systems with Non-Homogeneous Poisson Process*

When data has been the independent and not identically distributed, Non- homogeneous Poisson Process is used. The Non- homogeneous Poisson Process model is characterized by intensity function. The reliability can be examined by using this intensity function. In this paper, obtained as experimental, times between failures for test of the reliability of five machines are taken. Estimates of parameters with maximum likelihood method are obtained and intensity function models are written. Finally, reliability of consecutive 3-out-of-5:F systems are calculated for certain time periods by using the intensity functions.

● **CALIK, Sinan, BUGATEKIN, Ayse T. ,** Firat University, TURKEY

*On Moments of Sample Extremes of Order Statistics From Discrete Uniform Distribution*

In this study, the $m$th raw moments of sample extremes of order statistics from discrete uniform distribution are obtained. Finally, the results of sample extremes of order statistics of random variable for the independent and identically discrete uniform distribution are given.

● **BUYUKKAYA, Abdurrahman*, OZTURK, Mahpeyker**, ***Karadeniz Technical University, TURKEY, **Sakarya University, TURKEY

*Some Common Fixed Point Theorems for Expansion Mappings via (α,β)-Admissible Pairs in 2-Metric Spaces*

Alizadeh et al. introduced the notions of cyclic $(\alpha,\beta)-$admissible mappings and proved some fixed point results for such mappings in complete metric spaces. In this study, we establish some common fixed point theorems for expansion mappings by using class $\Psi$ via cyclic $(\alpha,\beta)-$admissible pairs on a 2-metric spaces, which are generalized some results in the existing literature.

● **CAI, Yangjian,** Soochow University, CHINA

*Partially Coherent Beams with Prescribed Beam Proporties*

Partially coherent beams are preferred in many applications, such as free-space optical communications, optical imaging, optical manipulation and remote detection. Partially coherent beam with prescribed beam properties (i.e., prescribed phases and correlation functions) have advantages over conventional partially coherent beam in many applications, and such beam displays many extraordinary properties. In this talk, I will introduce recent development of partially coherent beams with prescribed beam properties.

● **CAKALLI, Huseyin,** Maltepe University, TURKEY

*A Study on Statistical Quasi Cauchy Sequences*

A real valued function $f$ defined on a subset of the set of real numbers is λ-statistically upward continuous if it preserves λ-statistical upward half quasi-Cauchy sequences, where a real sequence $(\alpha_k)$ is called λ-statistically upward half quasi-Cauchy if $\lim_{n\to\infty}\frac{1}{\lambda_n}|\{k\in I_n: \alpha_k-\alpha_{k+1}\geq\varepsilon\}|=0$, $(\lambda_n)$ is a nondecreasing sequence of positive numbers tending to $\infty$ such that $\lambda_{n+1}\leq\lambda_n+1$, $\lambda_1=1$, and $I_n=[n-\lambda_n+1,n]$ for any positive integer $n$. It turns out that the set of λ-statistical upward continuous functions is a subset of the set of uniformly continuous functions on a below bounded set.

● **CANGUL, Ismail N.*, YURTTAS, A.*, TOGAN, M.*, CEVIK, A. S.**,** Uludag University, TURKEY, **Selcuk University, TURKEY

*Effect of Edge Deletion and Addition on Zagreb Indices of Graphs*

Topological graph indices are defined and used in many areas to study several properties of different objects such as atoms and molecules. Several topological graph indices have been defined and studied by many mathematicians and chemists as most graphs are generated from molecules by replacing atoms with vertices and bonds with edges. Two of the most important topological graph indices are called the first and second Zagreb indices denoted by $M_1(G)$ and $M_2(G)$, respectively: We consider the change in these indices for any simple graph G when an arbitrary edge is deleted or added. Also we calculate these changes when any arbitrary number of edges are deleted. This method can be used to calculate the first and second Zagreb indices of larger graphs in terms of the Zagreb indices of smaller graphs. As some examples, we gave some inequalities for the change of Zagreb indices for path, cycle, star, complete, complete bipartite and tadpole graphs.

● **CANKAYA, Mehmet N.*, BALEANU, Dumitru**, WU, Guo-Cheng***,** *Usak University, TURKEY, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA, ***Neijiang Normal University, CHINA

*On the Inference of Location and Scale Model in Estimating Functions*

This paper proposes the estimators for location and scale parameters using the idea of estimating functions. In the framework of the estimating functions, the combination score functions based on the classical and fractional calculus for the exponential power distribution are obtained. The mean squared errors of estimators for the score functions derived with the operators in the fractional calculus have smaller than that of the classical calculus for the different designs of randomly generated data set. The asymptotic variance-covariance matrix of estimators based on the estimating functions for the location and scale parameters is given.

● **CANKAYA, Mehmet N.*, WU, Guo-Cheng**, BALEANU, Dumitru***,** *Usak University, TURKEY, **Neijiang Normal University, CHINA, ***Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*Applications of Fractional Entropies on Image Analysis*

Recently, the entropies based on fractional calculus are studied. The entropy based on the tempered fractional calculus and the entropies proposed by [6] and [3] are used to apply the image analysis. The image in two classes are considered to test the performance of the entropies. The first one is on the maps [5]. The second one is on the pathological and non-pathological images. For two types of images, the tempered fractional type entropy that is generalized version of Shannon's entropy and Ubriaco's entropy is conservative than the Shannon entropy in the classical sense when there is an irregularity in an image. A comparison among the fractional entropies are performed as well.

● **CANKAYA, Mehmet N.*, BALEANU, Dumitru**, WU, Guo-Cheng***,** *Usak University, TURKEY, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA, ***Neijiang Normal University, CHINA

*Application of Fuzzy Fractional Derivatives in Statistics*

The fuzzy fractional derivatives are defined as a new concept in mathematics. The fuzziness in statistics and the fractional derivatives in mathematics are combined. The well-known functions in statistics, such as exponential power and power, are used to apply the new derivatives. The different forms, such as trapezoidal fuzzy number, gaussian fuzzy number, double parametric form of fuzzy number, the fuzziness in center, radius and width are given for these popular functions in statistics. The generalized form of gaussian fuzzy number is also considered as a new approach into fuzzy fractional derivatives. The results of these forms for the exponential power and power functions are obtained. The estimation in the fuzzy fractional derivative for location parameter of any probability distribution is obtained.

● **CANKAYA, Mehmet N. ,** Usak University, TURKEY

*Composite Type Likelihood Inference for Location and Scale Parameters*

The maximum likelihood estimation method is used to estimate the parameters in a probability density function. The full form of likelihood is applied on the data set. When the probability density function is not a heavy tailed, the full form of likelihood function is not robust. The weighted forms of likelihood function have been proposed and [3, 4] give a detailed discussion. In this study, the non-full form of likelihood estimation method is proposed to estimate the location and scale parameters when there is a contamination in a data set. The advantage of the proposed method is that the estimation method can estimate the parameters efficiently even though the probability density function is not heavy-tailed due to the fact that the modified form with the probability density function and a tuning parameter is considered. In the modified form, it can be considered that the probability density function and the tuning parameter control the behaviour of the function in the likelihood function. The advantage of the proposed approach will be useful when one encounters the modelling problem in the full likelihood estimation method for the estimations of location and scale parameters simultaneously.

● **CANKAYA, Mehmet N.*, BALEANU, Dumitru**,** *Usak University, TURKEY, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*Least Informative Distributions Based on Divergences*

The least informative distributions are derived by using the convex combinations of two density functions in the divergences. The convex combination of two distributions can also be called as a contaminated distribution. While deriving the least informative distribution, the calculus of variation method defined by [3] was considered by [6], based on minimizing of Fisher information. In our case, the divergences and their statistical properties are examined to propose the new least informative distributions for the location model, as proposed by [7].

● **SAKA, Bulent, CAYIR AYDAR, Aysegul, IRK, Dursun,** Eskisehir Osmangazi University, TURKEY

*A Numerical Solution of the RLW Equation by Least Squares Method*

In this article, the regularized long wave (RLW) equation

$$U_t + U_x + \varepsilon U U_x - \mu U_{xxt} = 0, \tag{1}$$

where *U(x,t)* is the wave amplitude, $\varepsilon$ and $\mu$ are positive parameters, and subscripts *x* and *t* denote differentiation, will be considered with boundary and initial conditions

$$\begin{aligned} &U(a,t) = \beta_1, U(b,t) = \beta_2, U_x(a,t) = 0, U_x(b,t) = 0, t \geq 0, \\ &U(x,0) = f(x). \end{aligned} \tag{2}$$

The RLW equation, which is introduced to describe development of an undular bore by Peregrine [1], has been used for models in many branches of the science such as ion-acoustic waves in plasma; magneto-hydrodynamics waves in plasma; the anharmonic lattice; longitudinal dispersive waves in elastic rods; pressure waves in liquid-gas bubble mixtures; rotating flow down a tube, thermally excited phonon packets in low temperature nonlinear crystals and the lossless propagation of shallow water waves. Few analytical solutions of the RLW equation are known for limited initial and boundary conditions. Therefore, availability of accurate and efficient numerical methods is essential. Various numerical techniques based on finite difference, finite element and spectral have been extensively studied. By using various types of B-spline functions, finite element methods within collocation [2,3] and Galerkin methods [4,5,6] have been worked out successfully with less error and high efficiency. Well known properties of waves, for instance, propagation and interaction of solitary waves, undular bore development, wave evolution are widely studied with high accuracy and efficiency by using these methods. In this paper, we have set up an algorithm, which is a finite element approach using least squares method over finite elements with quartic B-spline interpolation functions, for numerical solution of the RLW equation. Properties and advantages of this method are discussed and effect of quartic B-splines is sought in least squares method. In addition, results of some earlier works are also compared with that of the present algorithm.

● **CEYLAN, Tahir*, ALTINISIK, Nihat**,** *Sinop University, TURKEY, **Ondokuz Mayıs University, TURKEY

*Fuzzy Sturm-Liouville Problem*

In this paper we study eigenvalue and eigenfunction of fuzzy Sturm-Liouville problem with Hukuhara derivative. To do this we use a fuzzy initial value problem of second order differential equations. We approach to fuzzy problem transforming fuzzy interval eigenvalue problem by using the α- cut (level) method. For this we study different method which is used fuzzy coefficients of boundry conditions for fuzzy problem. Then results of the proposed method are illustrated with two simple numerical examples.

● **KARACA, Ismet, CINAR, Ismet,** Ege University, TURKEY

*Cohomology Structure of Digital Khalimsky Spaces*

Digital topology is a developing area in mathematics and it has excellent results for computer vision, image processing and computer graphics. First study in this area has been done by Rosenfeld [7] at the end of 1970s. Vergili and Karaca [5] introduce the digital singular homology groups of the digital spaces equipped with the Khalimsky topology by contructing the digital standart n-simplexes. Moreover, Vergili and Karaca [6] introduce the digital relative homology groups for the pair (X, A) where X is a digital Khalimsky space and A is a subset of X. In this paper, our aim is to study the digital singular cohomology groups of the digital spaces equipped with Khalimsky topology. Then, we investigate Eilenberg-Steenrod axioms, Universal Coefficent Theorem and Kunneth formula for this cohomology theory. Finally, we will construct a cup product and give general properties of new operation.

● **KIM, Daeyeoul*, IKIKARDES, Nazli Y.**, COLAK, Esra***,** *NIMS, SOUTH KOREA, **Balikesir University, TURKEY, ***Eskisehir Osmangazi University, TURKEY

*Mathematical Study of Virtual Tree Leaves Derived From Divisors*

In this studying, modelling of the leaves with the help of divisor functions are worked on. We investigate solutions of the equations $\sigma(n) = \sigma(n + 2k)$ and $\sigma_{2l}(n) = \sigma_{2l}(q)$. For a positive integer k ($1 \leq k \leq 100$) , all solutions of the equation $\sigma(n) = \sigma(n + 2k)$ with odd square-free integer n are given. Also, for a positive integer $l$ and odd prime $q$ , there are no results of the equation $\sigma_{2l}(n) = \sigma_{2l}(q)$. Further as an application, we pose the basic structure of the leaves model for real-time virtual ecosystem construction derived from the equation of shifted odd divisor functions. And the elliptic, flabellate and five-lobes leavess area and the growth process of the leaves were made modelling with the help of divisor functions.

FIGURE 1. Flabellate DLM (Ginkgo)

● **MAMEDOV, B. A.*, SOMUNCU, E.**, COPUROGLU, Ebru*, ***Gaziosmanpasa University, TURKEY, **Giresun University, TURKEY

*Quantum Corrections to Second Virial Coefficient with Lennard-Jones (12-6) Potential*

In this study, efficient analytical expression for the quantum corrections to second virial coefficient with Lennard-Jones (12-6) potential has been presented. The first and second derivatives of the analytical expression have been taken. Calculation results are presented to demonstrate the effectiveness of the analytical expression of at wide range of reduced

temperature. The results obtained from the analytical expression and its first two derivatives show in good agreement with of the literature data.

● **COPUROGLU, Ebru*, MAMEDOV, B. A.*, SOMUNCU, E.**, ***Gaziosmanpasa University, TURKEY, **Giresun University, TURKEY

*Analytical Evaluation of the Uehling Potential Using Binomial Expansion Theorems*

In this paper, we introduce a new method to study of Uehling potential using binomial expansion theorems. Note that, the Uehling potential is a powerful tool to determine the effect of vacuum polarization in atomic and muon-atomic systems. The method is illustrated by calculation of the Uehling potential with the simple binomial coefficients and exponential integral functions. The newly derived analytical expression well avoids the computational difficulties. An evaluation analysis of the Uehling potential is reported for arbitrary values of parameters.

● **ALTURK, Ahmet, COSGUN, Tahir,** Amasya University, TURKEY

*On the Solution of Fredholm Integral Equations of the First Kind*

The Fredholm integral equations of the first kind are often considered as ill-posed problems. The conventional way of solving them is to first convert them into the Fredholm integral equations of the second kind by means of the regularization method. This is solved by applying some standard techniques that are available for solving Fredholm integral equations of the second kind. This combination of two methods usually has some significant drawbacks in the sense that it may not produce a solution or produces only one solution. The aim of this study is to remove these impediments for separable kernels and provide a closed-form expression for obtaining one or infinitely many solutions.

● **CVETKOVIĆ, Marija,** University of Niš, SERBIA

*On the Ulam's Stability of Functional Equations via Perov Type Fixed Point Theorems*

Perov type fixed point theorems extend well-known results in the fixed point theory by introducing an operator as a contractive constant in the setting of the cone metric space. Existence and uniqueness of the fixed point are obtained for a wide class of mappings on solid cone metric spaces. Led by the many correlations between fixed point theory and Ulam's type stability problems, we try to approach this problem by introducing the cone metric space setting. We focus on applying Perov type fixed point theorems, obtaining and generalizing some recent results on Ulam's type stability of functional equations. Some comparisons between Ulam's type stability and generalized Ulam's stability are also made.

● **ERSOY HEPSON, Ozlem*, KORKMAZ, Alper****, **DAG, Idris*,** *Eskisehir Osmangazi University, TURKEY, ** Cankiri Karatekin University, TURKEY

*A Comparative Numerical Study Based on Cubic Polynomial and Trigonometric B-splines for the Gardner Equation*

Two cubic B-spline functions from different families are placed to the collocation method for the numerical solutions to the Gardner equation. Four models describing propagation of bell

shaped single solitary, travel of a kink type wave, wave generation and interaction of two positive bell shaped solitaries propagating in the opposite directions are studied by both methods. The error between the numerical and the analytical solutions is measured by using the discrete maximum norm when the analytical solutions exist. The absolute changes of the lowest three conservation laws are also good indicators of valid results even when the analytical solutions do not exist.

● **DEFTERLI, Ozlem*, OZMEN, Ayse**, WEBER, Gerhard-Wilhelm**,** *Cankaya University, TURKEY, **Middle East Technical University, TURKEY

*A Real-World Application for Genetic Regulatory Networks via Spline Regression Models*

Complex regulatory networks are high-dimensional real life phenomenas, that diverse from fields of science to engineering as well as from biology to finance, whose components are intimately interconnected and consist of unknown effects of additional parameters. The gene-environment regulatory networks is a subclass of such complex systems appearing in computational biology, medicine, system biology etc. whose dynamics are mathematically represented by a network matrix. The entires of the network matrix of genetic regulatory systems, which represents the network relations, can be selected as polynomial, trigonometric, exponential, logarithmic, hyperbolic and spline functions which contains unknown parameters to be identified. In this study, we consider to choose spline-based entries as the network matrix components to define the structure of the genetic regulatory systems although constant coefficients or polynomial functions are generally used in the literature. We apply a spline regression model for these systems that allows us to determine the unknown system parameters by applying the multivariate adaptive regression spline (MARS) technique in the investigation of a real-world complex biological system. We present the performance of our model on this real-world application and compare the corresponding results with existing models (linear regression etc.) based on some statistical criteria.

● **DELICEOGLU, Ali, BOZKURT, Deniz,** Erciyes University, TURKEY

*Structural Bifurcation of Divergence-Free Vector Fields near Non-simple Degenerate Points with Double Symmetry*

In this study, topological features of an incompressible two-dimensional flow far from any boundaries is considered. A rigorous theory has been developed for degenerate streamline patterns and their bifurcation. A homotopy invariance of the index is used to simplify the differential equation of fluid flows which are oneparameter families of divergence-free vector fields. When the degenerate flow pattern is perturbed slightly, a structural bifurcation for flows with double symmetry is obtained. From this, we give possible flows structure near the bifurcation point. New flow pattern is found that the degenerate cusp point appears on the x-axis.

● **DEMIRKOL AKYOL, Sebnem, BAYKASOGLU, Adil,** Dokuz Eylul University, TURKEY

*A Computational Approach for Ergonomic Assembly Line Balancing*

Inconvenient ergonomic conditions cause not only injuries and occupational diseases, but also production loss. Especially in assembly lines operated manually, it is crucial to evaluate ergonomic risk factors in order to provide well-beings of workers and productivity increase. In this study, a computational approach is proposed to deal with the ergonomic assembly line balancing problem (ALBP). A constructive heuristic which consists of 39 rules for sequencing and selecting tasks is developed and the well-known ALBPs are solved with considering ergonomic risk factors. There are 320 test instances which are grouped into four families: Heskia, Roszieg, Tonge and Wee-Mag. Each one of the families contains 80 instances. We run every single instance 10 times (replications) for 1000 iterations. We run our program for 3200 times and every run has a maximum iteration number of 1000. Experimental results show that ergonomic environment could be improved when ergonomic risk factors are considered.

● **DEMIRKOL AKYOL, Sebnem, BAYKASOGLU, Adil,** Dokuz Eylul University, TURKEY

*A Meta-Heuristic Approach for Evaluating Ergonomic Risk Factors of a Real Life Assembly Line Worker Assignment and Balancing Problem*

Controlling ergonomic risk level of the manufacturing environment is crucial in order to prevent occupational diseases and productivity loss. Although, massive part of the manufacturing plants in worldwide are composed of assembly lines operated by humans, and there is a need for ergonomic risk analyses in assembly lines, there are limited work in the literature. In this paper, assembly line worker assignment and balancing problem (ALWABP) by considering ergonomic risk factors is studied. Since the proposed problem is very complex and could not be solved by exact methods, a meta-heuristic solution procedure is proposed. The proposed heuristic is a constructive rule-based algorithm and implemented on a real life assembly system which produces harness for automotive sector. The tests were run on a Core 2 Duo i7 2.2 GHz processor. The results show that it is possible to reduce ergonomic risk level of the line without increasing the number of workstations.

● **KARACA, Ismet, DENIZALTI, Hatice S. ,** Ege University, TURKEY

*Persistent Homology Groups*

Persistence homology is a homology theory for point cloud data sets and this topic is an application of algebraic topology to problems of shape recognition in high-dimensional data [5]. We can follow how change the homology of a filtration of a topological space and we get some information about this space. The notion of persistence is first introduced in [6] and then generalized in [4]. In this poster, our aim is to change point data sets with a family of simplicial complexes. Hence we convert data sets into global topological objects and encode the persistent homology of data sets in the form of a parameterized version of a Betti numbers called as barcodes. We give an example of these techniques applied to a high-dimensional data set obtained from natural images that is an example of exploring topological structure in a high-dimensional data set.

● **DINCKAL, Cigdem,** Cankaya University, TURKEY

*Finite Element Analysis of Nano Scale Vibration of Microtubules in Living Cells: Nonlocal Euler-Bernoulli Beam Modelling*

In the present paper, a general analytical solution of nano scale vibration of microtubules has been studied. A new finite element solution is proposed. This solution is exact and based on Euler-Bernoulli beam theory. For this purpose, closed form solutions of frequency-dependent (dynamic) shape functions are explicitly derived. These functions can be employed to acquire analytic expressions for the coefficients of the dependent element stiffness matrix. Numerical results are exhibited to expound the effect of non-local behaviour and size effects on the vibration of microtubules. As a result of comparison of the findings, it could be said that a microtubule frequency is very dependent to material length scale parameters and nonlocal parameter. The rigidity resulting from consistent mass modelling gives greater value of frequencies as observed in the higher modes. Utilization of exact dynamic shape functions and stiffness terms ensures the formation of the proposed element that it is sufficient to obtain exact results. In other words, the present study requires only one element to obtain exact results.

● **DIRIK, Suleyman*, ATCEKEN, Mehmet**, YILDIRIM, Umit**,** *****Amasya University, TURKEY, **Gaziosmanpasa University, TURKEY

*Contact Pseudo-Slant Submanifolds of a LP-Sasakian Manifold*

In this paper, we study the geometry of the contact pseudo-slant submanifolds of a LP-Sasakian manifold. Necessary and sufficient conditions are given for a submanifold to be a pseudo-slant submanifold, contact pseudoslant product, mixed totally geodesic, $D_\theta$ and $D^\perp$ - totally geodesic in a LP-Sasakian manifolds.

● **DJORDJEVIĆ, Dragan S. ,** University of Niš, SERBIA

*Geometric Operator Theory: Fredholm Theory and Projections*

Decompositions of spaces induce matrix decompositions of bounded linear operators. On the other hand, in Fredholm theory many operators naturally induce decompositions of spaces. Thus, some aspects of operator theory are related to matrices of operators. Our idea is to prove some results in Fredholm theory and related topics, using these operator matrices. We call it *geometric operator theory*. We present some old and some new results.

● **DOGAN DURGUN, Derya, BAGATARHAN, Ali,** Celal Bayar University, TURKEY

*Average Covering Number for Some Graphs*

One of the most important problems reliability and vulnerability of interconnection networks. The interconnection networks are modeled by means of graphs to determine the reliability and vulnerability. Average covering number is one of the parameter that used to determine vulnerability. In this paper, we mention about average covering number of a graph and denoted by $\bar{\alpha}(G)$ where $G$ is simple, connected and undirected graph of order $n \geq 2$. In a graph $G=(V(G),E(G))$, a subset $S_v \subseteq V$ of vertices is the cover set of $G$

respect to $v$, if each edge of the graph is incident to at least one vertex of the set. The minimum cardinality among the cover sets of $G$ respect to $v$ is denoted by $\alpha_v(G)$. The average covering number of a graph $G$, defined as

$$\frac{1}{|V(G)|}\sum_{v\in V(G)}\alpha_v(G).$$

● **DOGRUER, Tufan*, TAN, Nusret**,** *Gaziosmanpasa University, TURKEY, **Inonu University, TURKEY

*Lead and Lag Controller Design by Optimization Method in Fractional Order Control Systems*

This paper aims to carry out the design of phase-lead and phase-lag controllers and develop a design procedure. The main objective of the presented design method is to obtain a stable and controlled system by designing the phase-lead and phase-lag controllers using integral performance criteria. The integral performance criteria are often used in assessing the performance of designed control systems. The controller design was implemented using an optimization model in Matlab Simulink environment. The system to be controlled is a fractional order system and was used in the optimization model through Matsuda's 4th-order integer approach. In the optimization model, the error is minimized by using the integral performance criteria and the controller parameters are obtained for the minimum error values. Finally, a numerical example showing the feasibility of the optimization method is presented in the study.

● **BAYKASOGLU, Adil, DUDAKLI, Nurhan, SENOL, Mumin E. ,** Dokuz Eylul University, TURKEY

*Solving Straight and U-shaped Assembly Line Balancing Problems via Constraint Programming*

The simple assembly line balancing problem (SALBP-1) that aims minimizing number of stations under the constraints of precedence relations and cycle time is one of the extensively studied problems in the assembly line optimization literature. Researchers developed both integer programming models and heuristic algorithms for solving SALBP-1. Nevertheless, to the best of our knowledge, there is no constraint programming (CP) model in the related literature for this problem. In this regard, a CP model is proposed for modeling and solving both straight and U-shaped assembly lines. The proposed CP models are compared with integer programming models. The proposed models are also tested against existing benchmark problems from the related literature. According to the preliminary results, the proposed CP model is able to produce effective solutions in a reasonable time.

● **BAYKASOGLU, Adil, DUDAKLI, Nurhan, OZSOYDAN, F. Burcin,** Dokuz Eylul University, TURKEY

*A GRASP Based Algorithm to Reduce Service Time in Fully Automated Parking System*

Nowadays rapidly growth in urban population and dramatic increase in vehicle numbers cause serious vehicle parking problem in cities. Fully Automated Parking Systems (FAPS) that use robots to store vehicles vertically utilize limited areas efficiently and provide environment friendly solution. However, complexity of the system gives rise to NP-hard optimization problems like assignment of the vehicles to slots and robots, routing the robots etc. In context of the study, an algorithm is developed to improve the performance of FAPS through minimizing waiting time of customers and service times. On this basis, Greedy Randomized Adaptive Search Procedure (GRASP) is used as the one of the most efficient methods in solving such optimization problem. The early results show that the algorithm enables to solve such dynamic and complex planning and scheduling problems efficiently.

● **DURMAZ, Gonca*, ALTUN, Ishak**, OLGUN, Murat*****,** *Cankiri Karatekin University, TURKEY, **Kirikkale University, TURKEY, ***Ankara University, TURKEY

*The Relations Between F-contractions and Weakly Picard Operators*

The aim of this talk is to discuss on some recent fixed point results for both single valued and multivalued mappings on complete metric space. Especially, considering fixed point theorems about F-contractions, some certain classes of multivalued weakly Picard operators are investigated. The relations of these classes are also pointed out by nontrivial examples.

● **EFENDIOGLU, Seda, EFENDIOGLU, Hilmi E. ,** Karadeniz Technical University, TURKEY

*An Alternative Computerized System for Step-by-Step Solution Analysis of Algebra Problems with Multiple Mathematical Expressions*

Algebra is used to express and solve the problems in many fields from engineering to social sciences. Therefore, students should be able to solve complex algebra questions involving mathematical expressions related to each other. This can only be possible if the solution steps of the questions are well understood. For this purpose, all intermediate operations performed, from expressing the problem to obtaining the solution, must be clearly shown to the students with the visual items. None of the Computer Algebra Systems (CAS) which are currently used for solving algebra questions meets all of the specified requirements. A computer-aided online environment is recommended according to the requirements specified in this study. The algebra questions received by the interface are prepared for the solution by pre-processing. Then the solution steps of the problem are shown. It is aimed to develop students' skills of algebra rapidly thanks to the proposed environment.

● **EGE, Ozgur*, KUMAR, Sanjay**, JAIN, Deepak**,** *Manisa Celal Bayar University, TURKEY, **Deenbandhu Chhotu Ram University of Science and Technology, INDIA

*Fixed Point of Various Contraction Conditions in Digital Metric Spaces*

In this paper, we prove the existence of fixed points for Kannan contraction, Chatterjea contraction and Reich contraction in setting of digital metric spaces. In fact, these digital contractions are the applications of metric fixed point theory contractions.

● **EGE, Ozgur*, KUMAR, Sanjay**, JAIN, Deepak**,** *Manisa Celal Bayar University, TURKEY, **Deenbandhu Chhotu Ram University of Science and Technology, INDIA

*Fixed Point Theorem for Commuting Mappings in Digital Metric Spaces*

Digital topology has attracted the attention of many researchers owing to its potential applications in some areas such as computer science, image processing, topology and fixed point theory. In recent times, various fixed point results have been given in digital metric spaces. In this paper, we prove a common fixed point theorem for commuting mappings in digital metric spaces and give an example in support of our result.

● **YARIMPABUC, Durmus*, EKER, Mehmet*, CELEBI, Kerimcan**,** *Osmaniye Korkut Ata University, TURKEY, **Adana Science and Technology University, TURKEY

*Forced Vibration Analysis of Non-uniform Piezoelectric Rod by Pseudospectral Chebyshev Method*

The Piezoelectricity is one of the most demanded feature for material of sensor and actuator. Main working principle of this kind of smart materials base on their vibration activities. Thus, it is important to know the vibration characteristic of piezoelectric materials. Forced vibration analysis of non-uniform piezoelectric isotropic rod with the consideration of mechanical and electrostatic equations together result in governing equation with variable coefficient. Analytical solution of such equation can not be obtained except for simple cross-section area. Numerical model of the forced longitudinal vibration of non-uniform piezoelectric (PZT-4) fixed-free supported rod are obtained in the Laplace space and then solved numerically by Chebyshev pseudospectral approach for arbitrary cross-section area under four different load functions. Solutions were transformed from Laplace domain to the time domain by applying modified Durbin's procedure. The technique is validated for simple cross-section area results that can also be solved analytically.

● **ELHARRAK, Meryeme, HAJJI, Ahmed,** Mohammed V University in Rabat, MOROCCO

*A Generalization of Darbo's Fixed Point Theorem and Application to Nonlocal Fractional Differential Equation*

Schauder fixed point theorem is one of the most fruitful and effective tools in nonlinear analysis. In 1955, Darbo proved the fixed point theorem for $\mu$-set contraction (i.e., $\mu(T A) \leq k\mu(A)$ with $k \in [0, 1)$) on a closed, bounded and convex subset of a Banach spaces in terms of the measure of noncompactness, which was first defined by Kuratowski. Darbo's fixed point theorem is a significant extension of the Schauder fixed point theorem, and it also plays a key

role in nonlinear analysis especially in proving the existence of solutions for a lot of classes of nonlinear equations. Since then many intersting works have appeared. We propose a new generalization of Darbo's fixed point theorem. Moreover, we derive from this theorem some consequences which are also a generalizations of Darbo's fixed point theorem. As application, we study the existence of a mild solution for nonlocal fractional differential equation.

● **EMINOGLU, Sehla, CEVIK, Cuneyt,** Gazi University, TURKEY

*Fuzzy Vector Metric Spaces and Some Results*

The aim of this paper is to enrich fuzzy metric spaces through vectors. Additionally we define the concept of fuzzy vector metric diameter to be able to prove such as Cantor's intersection theorem and Baire's theorem in a different way.

● **ERCAN, Ahu*, PANAKHOV, Etibar S.**,** *Firat University, TURKEY, **Baku State University, AZERBAIJAN

*Inverse Nodal Problem for Discontinuous Integro-Differential Operator*

In the present paper we study an inverse nodal problem for discontinuous integro differential operator. Inverse nodal problem consist in constructing operators from the nodes (zeros) of their eigenfunctions. We estimated nodal points and nodal lengths for the discontinuous integro-differential equation. We prove a uniqueness theorem: nodal points uniquely determine the potential function of a second-order integro-differential equation.

● **PANAKHOV, Etibar S.*, ERCAN, Ahu**,** *Baku State University, AZERBAIJAN, **Firat University, TURKEY

*Certain Stability Singular Sturm-Liouville Operator*

In this paper we study stability of inverse problem for Sturm-Liouville equation having special singularity at zero point using Ryabushko's method. We establish certain stability of spectral functions of two spectral problems for singular Sturm-Liouville operator. The method which used was given firstly by Ryabushko for regular Sturm-Liouville problem in [1].

● **ERCAN, Sinan, ALTIN, Yavuz, BEKTAS, Cigdem A. ,** Firat University, TURKEY

*On Weak λ-Statistically Convergence of Order α*

In this study, we introduce the concept of weak λ-statistical convergence of order α. Also, we give some properties of this mode convergence.

● **DEMIRIZ, Serkan*, ERDEM, Sezer**,** *****Gaziosmanpasa University, TURKEY, **Battalgazi Anatollian Imam Hatip High School, TURKEY

*On the Block Sequence Space* $\ell_P(E, B(r,s))$ *and Related Matrix Transformations*

The purpose of the present paper is to introduce the sequence space

$$\ell_P(E, B(r,s)) = \left\{ x = (x)_n \in w : \sum_{n=1}^{\infty} \left| \sum_{j \in E_n} r x_j + \sum_{j \in E_{n+1}} s x_j \right|^p < \infty \right\},$$

where $E = (E)_n$ is a partition of finite subsets of the positive integers and $r, s \in \mathrm{R} \setminus \{0\}$ and $\mathrm{p} \geq 1$. The topological properties and algebraical properties of this space are examined. Furthermore, we compute α− and β− duals of this space and characterize the matrix transformations from the space $\ell_P(E, B(r,s))$ to the space $X$, where $X \in \{\ell_\infty, c, c_0\}$.

● **BAYRAM, Elgiz, AYGAR, Yelda, EREN, Basak,** Ankara University, TURKEY

*Scattering Solutions of Impulsive Sturm-Liouville Equations*

In this study, we find scattering solutions of the impulsive Sturm-Liouville equations. We also investigate properties of the Jost function and scattering function of this equations.

● **ERHAN, Inci M.*, GULYAZ-OZYURT, Selma**,** *****Atılım University, TURKEY, **Cumhuriyet University, TURKEY

*On Some Fixed Points Theorems on Branciari b-Metric Spaces*

In this talk we introduce the concept of Branciari *b*-metric spaces and we present some new fixed point results. We defne α-admissible mappings on Branciari *b*-metric spaces defined via *b*-comparison functions and discuss the existence and uniqueness of fixed points of these mappings. Some illustrative examples are also included in the talk.

● **ERKOC, Murat E. , KARABOGA, Nurhan,** Erciyes University, TURKEY

*Comparison of* $l_1$ *Minimization and Greedy Algorithms for Recovering Sparse Frequency-Domain Signals*

This study is about comparison of the $l_1$ minimization method and greedy algorithms for recovering frequency domain signals under Nyquist rate sampling ratio. Firstly a non-sparse frequency-domain signal is generated. According to CS theory, to recover a signal under Nyquist rate, it needs to be sparse. For that reason, Fourier transform was applied to generate sparse test signal. After that, $l_1$ optimization and 2 greedy algorithms which are OMP and CoSaMP were applied to get the original signal by the help of MATLAB software. Performance metrics and related graphs are given at the end of this paper. Some inferences are made in the lights of this metrics and they are explained at the end of this paper. The reason why these two methods are focused in this paper is that they are widely used in practical applications of compressive sampling/sensing theory.

● **SAKA, Bulent, ERSOY, Ozlem, DAG, Idris,** Eskisehir Osmangazi University, TURKEY

*A Quartic Trigonometric B-spline Collocation Method for Solving the Kuramoto-Sivashinsky Equation*

The Kuramoto-Sivashinsky (KS) equation, which is frequently encountered in the study of continuous media, exhibits complex chaotic behaviour and have the following form

$$U_t + UU_x + \varepsilon U_{xx} + \nu U_{xxxx} = 0, \tag{1}$$

where $\varepsilon$ and $\nu$ are arbitrary constants which corresponding the growth of linear stability and surface tension, respectively. The equation includes terms of nonlinear advection $UU_x$, linear growth $U_{xx}$ and high order dissipation $U_{xxxx}$. When $\nu$ is zero, the equation gets reduced to Burgers equation. It is used as model equation in a number of applications including concentration waves and plasma physics, flame propagation and reaction-diffusion combustion dynamics, free surface film-flows and two face flows in cylindrical or plain geometries [1-3]. This study concerns with B-spline finite element method involving a collocation scheme with quartic trigonometric B-spline for numerical solution of the KS equation. For the numerical procedure, time derivative is discretized in the Crank-Nicolson scheme. Solution and its principal derivatives over the subintervals are approximated by the combination of the quartic trigonometric B-splines and unknown element parameters. The resulting nonlinear matrix system is solved by using Matlab packet program after the boundary conditions are applied. In order to show the accuracy of the algorithm and make a comparison of numerical solution with exact one is studied by test problems. Since the fourth order derivative exist in KS equation, to be able to apply the quartic trigonometric B-spline based collocation method, KS equation is space-splitted as

$$\begin{aligned} &U_t + UU_x + \varepsilon V + \nu V_{xx} = 0, \\ &V - U_{xx} = 0. \end{aligned} \tag{2}$$

Quartic trigonometric B-spline collocation method is employed for obtaining the numerical solution of the Eq. (2).

● **ERSOY HEPSON, Ozlem, DAG, Idris,** Eskisehir Osmangazi University, TURKEY

*Finite Element Method for Schnackenberg Model*

In the study, solution of an initial boundary value problem for the Schnackenberg reaction-diffusion model is considered in numerical meaning. The approximate solution is assumed to be a finite series some of extended form of the cubic B-spline basis. After adapting the boundary data, the system is integrated in time variable by using Crank-Nicolson implicit method. The resultant iteration algorithm is initiated by the aid of the initial data adaption. The numerical results are compared with the analytical solution by using the relative error calculation that measures the ratio of the difference in the two successive time levels to the previous time level to validate the accuracy and the reliability.

● **ESEN, Umut, CEVIK, A. Sinan,** Selcuk University, TURKEY

*An Alternating Alternative Sum over Semigroups*

In [1], the author provided by a new characterization over the family of semi-groups by considering the alternative sums. To do that it was considered a type of wirtinger presentations in terms of Artin which were obtained by directly the knot theory. In here, we aimed to push this study one step forward and so the goal of the study is to obtain some new semigroup family by considering the Pretzel links.

● **EVA-H. , Dulf[*], CRISTINA-I. , Muresan*, CLARA M. , Ionescu[**]**,*Technical University of Cluj-Napoca, ROMANIA, **Ghent University, BELGIUM

*Fault Tolerant Control of the $^{13}C$ Isotope Separation Cascade*

The $^{13}C$ isotope separation cascade – from control engineering point of view – is a multivariable, distributed, nonlinear system, with strong interactions between the subsystems. Being a complex chemical plant, a robust, fault tolerant control is needed. The present paper discusses the idea to re-distribute the control task among the subsystems, imposing new set-points for each subsystem by local information exchange when a fault occurs. In order to ensure robustness, in the present work fractional order PI controllers are used, having one more degree of freedom in comparison with the classical, integer order PI controllers. The advantages of the method are illustrated by simulation results presenting different real fault scenarios.

● **FARHAM, Mohammad S. , KHOEI, Arsham A. ,** Middle East Technical University, TURKEY

*Connected Maximal Covering Location Problem in the Continuous Plane*

Given a set of facilities with known coverage radius and a set of weighted demand points, the continuous connected maximal covering location problem (CCMLCP) seeks the location of each facility on the Euclidean plane in order to maximize total covered demands such that the connectivity between facilities is ensured. Connected maximal coverage problem is widely used in wireless sensor networks with discrete locations and is shown to be NP-hard. Here, we consider the continuous plane where the location of facilities is not limited to a set of candidate points. We provide the mathematical formulation of the CCMLCP using mixed integer second-order cone programming. The problem is solved using a commercial solver and numerical results are provided for a set of problem test instances.

● **FARIDYAHYAEI, Amin, TURAL, Mustafa K. , DURAN, Serhan,** Middle East Technical University, TURKEY

*A Multi-level Continuous Minimax Location Problem with Regional Demand*

The minimax location problem seeks for the locations of the facilities in the plane so that the maximum distance between the demanding entities (given points in the plane) and facilities is minimized. Remote entities (irrespective of their weights) tend to pull the facilities toward themselves which may result in larger distances for the others. In this study, we consider a multi-level minimax location problem which allows some of the entities to be covered in

outer levels and thereby reducing their impact on facility locations. We assume that entities are regions in the plane and associated with each, there is a weight representing its importance, e.g., weights might represent populations of the districts. We first model the single- and multi-facility versions of the problem as mixed-integer second order cone programming (MISOCP) problems. We then propose several heuristics and compare them with the MISOCP formulations in terms of solution quality and time.

● **Z. , Aouachria, FAROUK, Meguellati, S. , Bougoul,** Université de Batna, ALGERIA

*Numerical Simulation of New Modified VAWT*

A new bladed rotor design called the Modified Savonius rotor (the modified rotor blade consists of blades having elliptical form) is proposed and investigated to enhance the manufacturing process and its power coefficients. The continuity, Reynolds Averaged Navier-Stokes (RANS) equations and the Realizable (k-ε) model, using the standard near wall treatment, are numerically solved. Moreover, the torque and power coefficients are obtained by integrating the pressure and the wind strengths viscosity acting upon the rotor blades. The preliminary funding obtained for the conventional rotor with zero overlap are in agreement with those obtained experimentally by other authors what makes this method can be considered as a successful tool for such analysis. The findings show that the good enhancements in terms of power coefficient and fabrication process are achieved. In addition, the study has challenged the old idea of wind drag. Our new designs can be considered as attractive alternative candidate for future wind turbine-applications.

● **FEN, Mehmet O.*, AKHMET, Marat**, *****TED University, TURKEY, **Middle East Technical University, TURKEY

*Almost Periodicity in Chaos*

It was certified by Seifert (1997) and Shilnikov (2002) that it is possible to replace periodic motions by Poisson stable or almost periodic motions in a chaotic attractor. Despite the fact that the idea of replacing periodic solutions by other types of regular motions is attractive, very few results have been obtained on the subject. The present study contributes to the chaos theory in this direction such that we rigorously prove the existence of chaos with infinitely many almost periodic motions in systems of differential equations. Our technique is valid for systems with arbitrary high dimensions. Examples which support the theoretical results are provided.

● **FRIOUI, Assia, GUEZANE-LAKOUD, Assia, KHALDI, Rabah,** University of Guelma, ALGERIA

*Fractional Boundary Value Problems on the Half Line*

In this paper, we focus on the solvability of a fractional boundary value problem at resonance on an unbounded interval. By constructing suitable operators, we establish an existence theorem upon the coincidence degree theory of Mawhin. The obtained results are illustrated by an example.

● **GENCOGLU, Muharram T. ,** Firat University, TURKEY

*Use of Extented Laplace Transform at Solution of Control Engineering Problems*

In this paper, By appliying Laplace Transform to a function f(t), conditions of the power series expansion of F(u) obtained. After providing those conditions to transformation was called a "Power Series Transformation". The Power Series Transform was defined using an integral. The first part of this paper was given definition and properties of Power Series Transformation. In the next section, The Power Series Transform in control engineering was examined. Transfer functions of a linear system were obtained by taking transfer function of a linear system as The Power Series Transformation of output. A control engineering problem was solved by using extented Laplace Transform (The Power Series Transformation) in the last section.

● **GENCOGLU, Muharram T.*, BALEANU, Dumitru**,** *Firat University, TURKEY, ******Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*A New Method of Steganographic Cryptology*

In this paper a different cryptographic method is introduced by using Power series transform, codes of ASCII and science of steganographi. Here, we produce a new algorithm for cryptology, we use Expanded Laplace transformation of the exponential function for encrypting the plain text and we use codes of ASCII for support to the confidentiality of the chipertext. After, Chipertext have embedded by steganographic method in another plaintext to hide the existence of cihertext. We show corresponding inverse of Power Series transform for decryption.

● **KHANIYEV, Tahir*, GEVER, Basak*, HANALIOGLU, Zulfiye**,** *TOBB University of Economics and Technology, TURKEY, **Karabuk University, TURKEY

*Non-Stationary Distribution of Semi-Markovian Random Walk with a Generalized Reflecting Barrier*

The aim of this study is to investigate of non-stationary distribution of semi- Markovian random walk with a generalized reflecting barrier $(X(t))$. It is expressed by means of basic probability characteristics of the renewal sequence $(T_n, n = 1,2,\ldots)$ generated by inter-arrival times $(\xi_i, i = 1,2,\ldots)$ and random walk $(S_n, n = 1,2,\ldots)$generated by jumps with random quantities $(\eta_i, i = 1,2,\ldots)$.

● **GUEZANE-LAKOUD, Assia*, KHALDI, Rabah*, REBIAI, Ghania**, ***University of Badji Mokhtar-Annaba, ALGERIA, ******University of Guelma**,** ALGERIA

*The Nonexistence of Positive Solutions for Nonlinear Fractional System*

In this paper we will show the nonexistence of positive solutions for a nonlinear Riemann-Liouville fractionall differential equations with non local conditions. We consider in this paper the system of nolinear fractional differential equation where $2 < \alpha < 3$, $D^{\alpha}$ denote the Riemann-Liouville derivatives of order $\alpha$. We shall give sufficient conditions on $\lambda$ and *f*,

such that (S) has no positive solutions. The existence of positive solutions for (S) has been studied in [3] by using the Guo-Krasnosel'skii fixed point theorem. The multiplicity of positive solutions of the system (S) with $\lambda = 1$. In Section 2, we present the necessary definitions and properties from the fractional calculus theory and some auxiliary results from [29], which investigates a nonlocal boundary value problem for fractional differential equations. In Section [3], we prove some nonexistence results for the positive solutions with respect to a cone for our problem (S).

● **GIDEMEN, Hatice, ET, Mikail,** Firat University, TURKEY

*On f-Statistical Convergence of Generalized Difference Sequences*

The idea of statistical convergence was given by Zygmund [11] in the first edition of his monograph published in Warsaw in 1935. The concept of statistical convergence was introduced by Steinhaus [10] and Fast [6] and later reintroduced by Schoenberg [9] independently. Over the years and under different names statistical convergence has been discussed in the theory of Fourier analysis, Ergodic theory, Number theory, Measure theory, Trigonometric series, Turnpike theory and Banach spaces. Later on it was further investigated from the sequence space point of view and linked with summability theory by Aizpuru et al. [1], Bhardwaj and Dhawan [2], Connor [3], Et [4], Fridy [7], Salat [8] and many others. In recent years, generalizations of statistical convergence have appeared in the study of strong integral summability and the structure of ideals of bounded continuous functions on locally compact spaces. Statistical convergence and its generalizations are also connected with subsets of the Stone-Čech compactification of the natural numbers. Moreover, statistical convergence is closely related to the concept of convergence in probability. In this study using the generalized difference operator $\Delta^m$ and an unbounded modulus function, we generalize the concepts of f-statistical convergence and strong p-Cesaro convergence with respect to a modulus f. It is shown that, under certain conditions on a modulus f, the concepts of strong p-Cesaro convergence with respect to a modulus f and f-statistical convergence are equivalent of generalized difference sequence for $\Delta^m$ -bounded sequences.

● **GIRESUNLU, Ilker B.*, YASAR, Emrullah**, ***Bilecik Seyh Edebali University, TURKEY, **Uludag University, TURKEY

*On the Lie Symmetry Analysis and Group Invariant Solutions of Some Logarithmic Evolution Equations*

In this presentation, we consider logarithmic (1+1) dimensional KdV-like [1] and (2+1) dimensional KP-like equations [2] which model many physical process in the field of soliton theory. First we get the classical Lie point symmetries, optimal systems and corresponding reductions [3] using the invariance theory. In addition, we obtain non-classical symmetries [4] and corresponding solutions of underlying models.

● **GIRGIN, Ekber, OZTURK, Mahpeyker,** Sakarya University, TURKEY

*Common Fixed Points of Twisted Cyclic (α,β)- F – Contraction on Modular Spaces*

In the present work, we introduce the notions of twisted cyclic (α,β)- F- contraction using the method of twisted cyclic (α,β)-admissible mapping. We prove some new common fixed point

results in the setting of modular spaces. The obtained results generalize, unify and modify some recent theorems in the literature.

● **GOK, Gokhan*,**, ERDEM, Esra**, ARIKAN, Orhan*, ARIKAN, Feza*****, *Bilkent University, TURKEY, **Radar Electronic Warfare and Intelligence Systems Division, Aselsan A.S, TURKEY, ***Hacettepe University, TURKEY

*A Numerical Method for Calculation of Ionosonde Virtual Height*

Ionosondes are remote sensing instruments that transmits modulated HF pulses to the ionosphere for monitoring electron density profile. Round trip delays of the received echoes are converted to virtual heights. Ionogram plots containing virtual heights at different frequencies provide information about the vertical profile of the ion distribution. In many applications including electron density model validation and model based reconstruction of electron density profiles, it is needed to calculate virtual heights from electron density profiles. In this work, we propose a numerical method for calculating virtual heights for a given vertical electron density profile. Integral equation with a boundry singularity forms the foundation between electron density profile and virtual heights. Proposed method applies a numerical integration technique known as Gauss-Kronrod quadrature to solve this integral accurately. Extensive simulation results show that proposed method can calculate virtual heights accurately and validated with IONOLAB-RAY which is a HF wave propagation algorithm.

● **GOKCE, Fadime, SARIGOL, Mehmet A. ,** Pamukkale University, TURKEY

*On Absolute Euler Spaces and Related Matrix Operators*

In recent papers, Euler sequence space $e_p^r$ and $e_\infty^r$ were defined and studied by Başar, Altay and Mursaleen. In the present study, we extend these spaces by using the absolute Euler method in place of p-summable, which include the spaces $l_p, l_\infty, e_p^r$, $e_\infty^r$, investigate some topological structures, and determine $\alpha-, \beta-, \gamma-$ duals and base. Further, we characterize certain matrix and compact operators on those spaces, and also obtain their norms and Hausdroff meausures of noncompactness.

● **GOKDERE, Gokhan, GURCAN, Mehmet,** Firat University, TURKEY

*Repairable Circular Consecutive-2-out-of-n: F System with Unequal Constant Failure Rates*

In the reliability analysis of complex systems with repairable components it is often as-sumed that the components have equal constant failure rates [1-4]. But this assumption is not justified in many situations. For example, components of the same brand that were made in different factories or times show varying life spans. In this study we have introduced a theoretical model for repairable cir-cular consecutive-2-out-of-n: F system when components have unequal constant failure rates. It is as-sumed that the working time of each component are independent exponentially distributed random vari-ables with different means. The repair times is also an exponential random variable and every compo-nent after repair is as good as new. Inspired by the idea of the generalized transition probability, we derive the state transition probability of the system. Then, important reliability indices such as availa-bility, rate of occurrence of failure, mean time between failures, reliability and mean time to first failure are evaluated for an example.

● **GOKGOZ, Nurgul,** Cankaya University, TURKEY

*Stochastic Modeling of Tumor-Immune Systems*

Hybrid Systems exhibit both continuous and discrete dynamic behavior. They are useful in the sense of modeling complex interactions because of their flexibility properties. Hybrid systems are suitable for use in inferential modeling due to their analytical and computational advances. By hybrid systems with memory phenomena, representation of factors which may depend on whole history rather than a combination of historical events can be efficiently modeled. Most complex systems in real life are inherently stochastic. In this work, we investigate and analyze tumor-immune interaction with a stochastic modeling approach.

● **ATMACA, Sukru U. , GOKTEPELI, Ilker,** Selcuk University, TURKEY

*Evaluation of Turbulence Models for Heat Transfer in Horizontal Parallel Plates*

Heat transfer between parallel plates is a well-known case encountered fundamentally in various applications. With this perspective in the present study, turbulent flow and heat transfer characteristics in horizontally placed parallel plates have been obtained and compared by means of different turbulence models. These methods are k-ε Realizable, k-ε Re-Normalisation Group (RNG), standard k-ω and k-ω Shear Stress Transport (SST) turbulence models included in Computational Fluid Dynamics (CFD) software. Concordantly, parallel plates are assumed to be kept at constant wall temperature of 400 K while water at 300 K enters to the system with 0.15 m/s. On the other hand, heat transfer between isothermal plates and fluid has been provided with turbulence due to fluid flow at Re = 6000. As a conclusion, the closest result to the empirical correlation has been acquired by using standard k-ω turbulence model among the investigated ones.

● **GOLCUK, Ilker, BAYKASOGLU, Adil,** Dokuz Eylul University, TURKEY

*Fuzzy Cognitive Maps via Nonlinear Hebbian Learning and Artificial Bee Colony Algorithm*

Fuzzy cognitive maps (FCMs) are neuro-fuzzy systems, which are capable of modeling field experts' domain knowledge in linguistic terms. FCMs combine neural networks and fuzzy logic in a synergistic way that enables both knowledge representation and learning. Traditionally, FCMs rely on experts' experience and knowledge, however, there are some circumstances where the human knowledge cannot be obtained. In order to overcome such weaknesses, several learning procedures have been proposed in the literature. In this study, a hybrid learning approach by combining nonlinear hebbian learning with the artificial bee colony algorithm is utilized for intelligent support in decision making under multiple criteria. The proposed model is applied in handling interrelationships among Enterprise Resource Planning (ERP) implementation risk factors. Experimental results suggest that the hybrid learning approach successfully captures possible interrelationships among risk factors and help decision makers in FCM construction.

● **GOLCUK, Ilker, BAYKASOGLU, Adil,** Dokuz Eylul University, TURKEY

*Comparing New Granular Computing Paradigms with Traditional Fuzzy Approaches in Analytical Hierarchy Process*

Granular computing (GrC) is an emergent paradigm which is considered as a unified conceptual and information processing framework. Intelligent systems are endowed with uncertainty handling capabilities, which comes to mean that operations are carried out in the presence of perceptions, opinions, and subjective judgements. Among the existing multiple-attribute decision making methods, analytical hierarchy process (AHP) have enjoyed a visible position in transforming experts' linguistically expressed judgements into priorities and rankings. Although many applications of AHP have been reported in the literature, fuzzy AHP has been a subject of criticism for several reasons. Recently, GrC has offered some key formalisms in constructing information granules in the light of experimental evidence, which in turn help overcome some of the criticisms directed towards traditional fuzzy AHP. In this study, challenges and prospects of GrC approaches in modeling subjective judgements in AHP are discussed along with the comparisons with traditional approaches.

● **KAYA, Dogan, GULBAHAR, Sema,** Istanbul Commerce University, Turkey

*Numerical Solutions of the Nonlinear Time- Fractional KdV-Burgers-Kuramoto Equation*

In this study, a numerical solution of the nonlinear time-Fractional KdV- Burgers-Kuramoto equation is obtained by the finite difference methods. We compare the numerical solutions with corresponding analytical solutions. For the solution process, different linearization techniques have been applied to get over the non-linear term existing in the equation. Furthermore, the error norms $L_2$ and $L_\infty$ are computed. Von Neumann stabity analysis shows that the given methods are unconditionally stable.

● **GULER, Ipek,** Cankaya University, TURKEY

*Photoluminescence and Optical Absorption Properties of Silicon Nitride Thin Films*

Silicon nanoparticles embedded in a dielectric matrix have received great interest over ten years. The nanometer scale induces drastic changes in the physical behavior of matter. There is a strong relation between the particle size and band gap. These properties can be applied to silicon to investigate new optoelectronic silicon based devices such as next generation of full-color flat panel displays and LEDS. Silicon nanoparticles attract the attention of scientists for also the application in photovoltaic in the context of tandem cells. These tandem cells consist of taking advantage of the quantum confinement of silicon nanoparticles. If the size of the silicon nanoparticles can be controlled, the energy of the absorbed light can be controlled and more photons can be absorbed in the solar cells. In this work, plasma enhanced chemical vapor deposition (PECVD) technique was used to deposit SiNx thin films. The process gases sirane ($SiH_4$) and ammonia ($NH_3$) were used for PECVD. The flow rate of the $NH_3$ was changed but the flow rate of the $SiH_4$ kept constant to obtain the different ratio nitride (x) in the $SiN_x$ films. Elipsometer was used to obtain the information about thickness and refractive index of the films. Fourier transform infrared spectroscopy (FTIR) was used to get information about absorption ratios of the films and the bond types in the films. The bands at 460 $cm^{-1}$ , 1170 $cm^{-1}$ , 2160 $cm^{-1}$ and 3360 $cm^{-1}$ correspond to Si-N symmetric streching, N-H wagging , Si-H streching, N-H streching modes respectively. The intense absorption band that

correspond to Si-N asyymetric streching mode was observed from 832 $cm^{-1}$ to 844 $cm^{-1}$. The shift in the Si-N asyymetric streching mode was observed most probably because of decomposition of silicon nitride matrix. While $SiH_4$ flow rate value decreases the N-H peaks increase whereas Si-H peaks increase. The reason of the increase in Si-H peaks is due to the decrease in the silicon atoms which have dangling bonds. The decrease in silicon atoms dangling bonds can be explained by formation of silicon clusters in the silicon nitride film during the growth process. Therefore, the size of the silicon clusters decreases with increasing the gas flow ratio. This result can explain the blueshift of the photoluminescence ( PL ) peak, since the creation of nucleation sites leads to the formation of small silicon clusters in SiNx films and, therefore, the shift of the PL peak emission to the higher energies can be attributed to the quantum confinement effect.

● **GULYAZ-OZYURT, Selma*, ERHAN, Inci M.**,** *Cumhuriyet University, TURKEY, **Atılım University, TURKEY

*Geraghty Type Contractions on Branciari b-Metric Spaces*

In this talk we introduce α-admissible mappings of Geraghty type on Branciari b-metric spaces. We give several results on the existence and uniqueness of fixed points for such mappings. In addition, we present particular examples to illustrate our results.

● **GURBUZ, Ferit,** Ankara University, TURKEY

*Multilinear BMO Estimates for the Commutators of Multilinear Fractional Maximal and Integral Operators on the Product Generalized Morrey Spaces*

In this paper, we establish multilinear BMO estimates for commutators of multilinear fractional maximal and integral operators both on product generalized Morrey spaces and product generalized vanishing Morrey spaces, respectively. Similar results are still valid for commutators of multilinear maximal and singular integral operators.

● **GURBUZ, Ferit,** Ankara University, TURKEY

*Adams-Spanne Type Estimates for the Commutators of Fractional Type Sublinear Operators in Generalized Morrey Spaces on Heisenberg Groups*

In this paper we give BMO (bounded mean oscillation) space estimates for commutators of fractional type sublinear operators in generalized Morrey spaces on Heisenberg groups. The boundedness conditions are also formulated in terms of Zygmund type integral inequalities.

● **GURBUZ, Ferit,** Ankara University, TURKEY

*Fractional Type Multilinear Commutators Generated by Fractional Integral with Rough Variable Kernel and Local Campanato Functions on Generalized Vanishing Local Morrey Spaces*

In this paper, we consider the boundedness of fractional type multilinear commutators generated by fractional integral with rough variable kernel and local Campanato functions both on generalized local (central) Morrey spaces and generalized vanishing local Morrey

spaces, under generic size conditions which are satisfied by most of the operators in harmonic analysis, respectively.

● **GURBUZ, Merve, TEZER-SEZGIN, M. ,** Middle East Technical University, TURKEY

*Numerical Stability of RBF Solution for Unsteady Full MHD Flow Equations*

This paper considers the numerical stability of radial basis function (RBF) approximation of full magnetohydrodynamics (MHD) unsteady flow equations in terms of velocity and magnetic potential. The explicit Euler method is used for the discretization of the time derivatives. The stability analysis is performed in terms of spectral radius of related coefficient matrices for several values of the time increment, relaxation parameters and the other problem variables. The numerical results show that as Reynolds number and magnetic Reynolds number increase, quite large time increments can be taken with a fixed relaxation parameter. The increase in the Hartmann number requires smaller time increments for a range of relaxation parameters. The numerical stability is achieved by finding optimal choices for the relaxation parameter and time increment intervals which are tabulated for several values of Reynolds, magnetic Reynolds and Hartmann numbers.

● **GUREL YILMAZ, Ovgu*, ARAL, Ali**, TASDELEN YESILDAL, Fatma*, ***Ankara University, TURKEY, **Kirikkale University, TURKEY

*On Szasz-Mirakyan Type Operators Preserving Polynomials **

In this paper, a modification of Szasz-Mirakyan operators is studied [1] which generalizes the Szasz-Mirakyan operators with the property that the linear combination $e_2 + \alpha e_1$ of the Korovkin's test functions $e_1$ and $e_2$ are reproduced for $\alpha \geq 0$. After providing some computational results, shape preserving properties of mentioned operators are obtained. Moreover, some estimations for the rate of convergence of these operators by using different type modulus of continuity are shown. Furthermore, a Voronovskaya-type formula and an approximation result for derivative of operators are calculated.

● **AL JAYI, Yassine, HAMIDI ALAOUI, Abdelhamid**, Al Akhawayn University, MOROCCO

*Statistical-Arbitrage-Based Trading Strategies in the Casablanca Stock Exchange: A First Investigation*

Pairs trading represents a major statistical arbitrage strategy that was unveiled in the mid-eighties in Wall Street. Although the strategy is based on simple reasoning, it led to significant risk-adjusted abnormal returns. The strategy consists of identifying two stocks that historically move together; then, use a proprietary analysis to identify their divergence to trigger a trading signal. Assuming that the pairs relationship will hold in the future, trade is made through going short on the undervalued stock and long on the overvalued one. Once the stocks return to their historical relationship, the positions are closed. This research investigates this strategy in the Casablanca Stock Exchange, based on the distance approach proposed in Gatev, Goetzmann, and Rouwenhorst (1999). This work uses daily closing prices from January 4th 2008 to October 30th 2015, using a sliding window approach. The main finding is that this strategy generates mean negative returns of at least -25.65%. The study concludes that further research has to be conducted to why, in the Moroccan market, such

obvious basic pairs relationship stops holding in the future and generates losses for traders when used to forecast price movements.

● **HASHEMI, Mir Sajjad,** University of Bonab, IRAN

*Analytical Investigation on the Fractional Diffusion-Absorption Equation*

In this paper, the Lie symmetries of the diffusion-absorption equation with time fractional term are obtained and corresponding exact solutions are extracted by the invariant subspace method. Exact solutions of this equation with fractional term are compared with solutions in the integer ones.

● **HASSAN, Mohamed Y., PEHLIVAN, Huseyin,** Karadeniz Technical University, TURKEY

*Design and Implementation of a General Interpreter for Automatic Generation and Step-by-Step Solving of Non-Linear System of Equations Using Symbolic Approaches*

In this work, we present the design and implementation of an interpreter program for the step-by-step numerical solutions of non-linear systems of equations with multiple variables, using symbolic computation methods and automatic code generation tools. The development process starts with a representation of a non-linear system of equations in formal language in terms of context-free grammars. Then, a parser which is generated via the JavaCC tool is used to represent the non-linear system of equations in the form of object structures. The numerical methods such as fixed-point and Newton-Raphson methods are employed to obtain better approximations to solutions of non-linear systems. The interpreter can easily be extended to cover other numerical methods, only describing the related iterative computation steps. On the other hand, integrating into their own interactive development environments, researchers can input any system of non-linear equations directly into the interpreter and get the approximating solution as an output.

● **HIRA, Fatma,** Hitit University, TURKEY

*A Trace Formula for the Sturm-Liouville Type Equation with Retarded Argument*

We deal with the following discontinuous Sturm-Liouville problem with retarded argument and eigenparameter-dependent boundary conditions:

$$y''(x)+q(x)y\left(x-\Delta(x)\right)+\lambda^2 y(x)=0,\quad x\in\left[0,\frac{\pi}{2}\right)\cup\left(\frac{\pi}{2},\pi\right], \tag{1}$$

$$\left(\lambda\alpha_1'+\alpha_1\right)y(0)-\left(\lambda\alpha_2'+\alpha_2\right)y'(0)=0, \tag{2}$$

$$\left(\lambda\beta_1'+\beta_1\right)y(\pi)-\left(\lambda\beta_2'+\beta_2\right)y'(\pi)=0, \tag{3}$$

$$y\left(\frac{\pi}{2}-0\right)-\delta y\left(\frac{\pi}{2}+0\right)=0, \tag{4}$$

$$y'\left(\frac{\pi}{2}-0\right)-\delta y'\left(\frac{\pi}{2}+0\right)=0. \tag{5}$$

We obtain the asymptotic formulas for the eigenvalues and the regularized trace formula for the problem (1)-(5).

● **HRISTOV, Jordan,** University of Chemical Technology and Metallurgy**,** BULGARIA

*Stokes' First Problem for a Casson Fluid: From Integer to Fractional Models by Integral-Balance Approach*

Casson fluids are non-Newtonian fluid exhibiting yield stresses. Concentrated cement suspensions and human blood can be treated as Casson fluids due to chain formation by the particles suspended in the continuous phase. The Stokes' has been investigated in case of integer-order and different time-fractional derivatives. The approximate closed form solutions have been developed by a synergetic combination of the integral-balance approach using parabolic profile with unspecified exponent and the least-squares method. This approach allowed creating a physically explicit solution with well defined similarity variables accounting both the Newtonian and non-Newtonian effects in the transient flow.

● **BAIRAMOV, Elgiz*, HUSEYIN, Adil**,** *Ankara University, TURKEY, **Karabuk University, TURKEY

*An Eigenvalue Problem for Quadratic Pencil of q-Equations and Its Applications*

This work is devoted to the study of the properties of eigenvalues and eigenfunctions of a quadratic pencil of q-equations. The results obtained are then used to solve the corresponding system of differential equations with boundary and initial conditions.

● **IBIS, Birol,** Turkish Air Force Academy National Defense University, TURKEY

*A New Numerical Method for Solving Variable Order Fractional Differential Equations*

This study aims to develop a new numerical method for solving a class of variable-order fractional differential equations. The main characteristic behind the method using this technique is that it reduces variable-order fractional differential equations to those of solving a system of algebraic equations by using Bernoulli polynomials and operational matrices. By solving the algebraic system, the numerical solutions are obtained. Illustrative examples are included to demonstrate the validity and applicability of this method.

● **SAHINER, Ahmet, IBRAHEM, Shehab A. ,** Suleyman Demirel University, TURKEY

*New Global Optimization Technique by Using Auxiliary Function Method in Directional Search via Pieswise Smoothing*

In this study, we introduce a new global optimization technique for a multi-dimensional nonsmooth unconstrained optimization problem. First, we make objective function smooth by using piecewise smooth functions. Second, we transforme the multi-dimensional problem into a one-dimensional problem by using auxiliary function to reduce the number of local minimizers, then find the global minimizer of one-dimensional problem. Finally, we find the global minimizer of the multidimensional nonsmooth objective function with the help of a new algorithm.

● **ICEN, Duygu, BACANLI, Sevil,** Hacettepe University, TURKEY

*Fuzzy Hypothesis Testing for Inverse Gaussian Mean When Scale Parameter is Unknown*

In this study, we propose to use Buckley's approach in the fuzzy hypothesis testing process for inverse Gaussian mean when the scale parameter is unknown. It is well known that the inverse Gaussian distribution is a very useful alternative to the popular life time distributions such as Weibull, gamma and log-normal. The distribution is found to have several applications in a variety of fields where mathematics plays significant role, such as economics, reliability theory and life testing. Buckley's approach uses set of confidence intervals by taking into consideration both of the uncertainty and impreciseness of concepts that produce triangular shaped fuzzy numbers for the estimator and hypothesis testing. This fuzzy method provides to indicate uncertainty better and represent knowledge more explicitly than classical methods. Hence, this study aims to apply Buckley's confidence interval approach for inverse Gaussianmean when the scale parameter is unknown. Also a comparison is made between the fuzzy and non-fuzzy (classical) test procedure.

● **ILHAN, Yasin, LATIFOGLU, Fatma,** Erciyes University, TURKEY

*Determination of T2 * Value in Thalassemia Patients by Artificial Bee Colony Algorithm*

Thalassemia is a preventable disease in hereditary anemia. Iron Overload in Thalassemia patients are particularly observed in heart and liver in the body. Iron overloadin Magnetic Resonance Imaging(MRI) is calculated by measuring T2*(T2 Star) value. In this study, thalassemia, an indicator of iron overload from occurring in the heart and liver were developed for patients with T2 * value determined by measuring the interface. Calculation of T2 * values developed in the program is performed in two stages; Region of Interest(ROI) selection and T2 * values calculation. In this study, T2 * values to determine the best way, Nonlinear Least Squares Approximation algorithm and Artificial Bee Colony algorithm are used. In addition, Comparing the reference system with the realization that the system, sample the six individuals in cardiac T2 * measurements made, in healthy individuals 43(±1,32),45,4(±2,2) values and in thalassemia patients 7,8(±0.95),3,8(±0,36) ve 6,64(±2,18) values were obtained. As a result, the developed system has been observed that the T2 * measurements carried out with success.

● **IMAD, Rezzoug, ABDELHAMID, Ayadi,** Oum el Bouaghi University, ALGERIA

*Sentinels Punctual Sentinel*

Based on the theory of regional controllability, we have constructed the regional sentinel, the new concept of regional sentinel and punctual sentinel have been applied to the estimation of pollution term independently of missing term with support in zone regionally controllable.

● **IMIK, Ozlem, ALAGOZ, Baris B. , ATES, Abdullah, YEROGLU, Celaleddin,** Inonu University, TURKEY

*Fractional Order Filter Discretization by Particle Swarm Optimization Method*

Fractional order filter functions are a generalization of rational filter functions that include integer-order filter functions, and they present advantages of more options in amplitude

response for frequency selectivity of filters compared to integer-order filter counterparts. This study presents an application of particle swarm optimization (PSO) method for the IIR filter discretization of fractional order continuous filter functions. The proposed method selects particles that result in stable filter solutions. This ensures the stability of optimized IIR filter functions. In the paper, illustrative filter discretization examples are demonstrated to show results of proposed method and these results are compared with results of continued fraction expansion (CFE) approximation method. We observed that proposed fractional order filter discretization method can be more approximate to the amplitude response of fractional order filter functions at the stop bands compared to CFE approximation method, which are indeed very substantial in frequency selectivity of filters.

● **IMIK, Ozlem*, ALAGOZ, Baris B.*, YEROGLU, Celaleddin*, ALISOY, Hafiz**, ***Inonu University, TURKEY, ** Namik Kemal University, TURKEY

*Discretization of Fractional Order Transfer Function by Particle Swarm Optimization Method*

Since increasing utilization of fractional order calculus in engineering, fractional order system models are frequently used in numerical analysis and system simulations. Therefore, there is need for fractional order transfer function (FOTF) discretization methods, which can meet application requirements such as better amplitude or phase response approximations in operating frequency ranges. This study presents an application of particle swarm optimization (PSO) method for discretization of FOTFs for discrete implementation of fractional order systems. The proposed method allows adjusting approximation performance of an IIR filter between phase and amplitude response objectives by defining a weight coefficient in cost function. In order to improve performance of discrete approximation, particles are initialized around the solution of CFE method. This allows further improvement of solutions of CFE method by proposed PSO algorithm. Moreover, stability of resulting solution is ensured by the proposed method and this is very important asset for practical applications.

● **IPEK, Pembe, ISMAILOV, Zameddin I. ,** Karadeniz Technical University, TURKEY

*The General Form of Maximally Accretive Quasi-Differential Operators for First Order*

In this work, firstly all maximally accretive extensions of the minimal operator generated by first order linear symmetric multipoint quasi-differential operator expression in the direct sum of weighted Hilbert spaces of vector-functions defined at the left and right semi-infinite intervals are described. Later on, the structure of spectrum of such extensions is investigated.

● **ISIK, Umran, GUVEN, Aysegul, BATBAT, Turgay,** Erciyes University, TURKEY

*Evaluation of Obstructive Sleep Apnea from Polysomnography Signals with Wavelet Transform*

Obstructive Sleep apnea (OSA) is one of the most important sleep disorders. Respiratory arrests and following respiratory efforts in the absence of airflow during sleep stages mainly characterises the disease. Polysomnography is the main method for diagnosis of the disease comprising physiological signals such as Electroencephalogram; Electrooculogram; Electromyogram; Electrocardiogram; Airflow; Oxygen Saturation; Respiratory Effort etc. collected throughout the night sleep. The aim of this study is to evaluate OSA situation for 6

OSA patients and 6 controls from Erciyes University Sleep Laboratory as taking apnea samples from REM & NREM stages from nasal channel and applying Wavelet Transform to Electroencephalography channels from polysomnography signals to those chosen parts. Mean, variance & entropy of the signals' Wavelet coefficients are calculated after which're used as attributes for evaluating OSA situation via various classifiers such as Bayes Net, Multilayer Perceptron, K-nearest neighbours, Decision Table, Random Forest etc. Better results are obtained for NREM than REM samples, i.e., Correctly Classified Instances are 97.9% for each Multilayer Perceptron & K-nearest neighbours for NREM samples whereas 95.2% and 92.9% for REM samples.

● **JAFARI, Hossein*, TEJADODI, Haleh*, BALEANU, Dumitru**, ***University of South Africa, SOUTH AFRICA, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*B-Spline Functions: A Tools for Solving of Fractional Partial Differential Equations*

In this paper, we construct operational matrix of fractional Riemann-Liouville integration using linear B-spline function. After that we present a numerical approach for solving linear fractional partial differential equations. Here the fractionalderivative is used in the Caputo derivative sense. Finally we solve some fractional partial differential equations that demonstrate the accuracy and applicability of presented method in the current paper.

● **JAFARI, Saeid, GHAFFARI, Ali,** Islamic Azad University, IRAN

*A Study on the Pressure Oscillations in the Water Distribution Network Before and Behind the Solenoid Valve*

Leakage in water distribution networks in urban and rural is inevitable. Today, reducing leakage using hydraulic parameters management such as pressure on leak detection project is of particular importance. Intelligent control of pressure is a good way to control leakage and reduce damage caused by high pressure in water distribution networks and applying the results of conducted studies in this regard is needed to help new equipment. In the provided topic, the main objective is to determine the effect of pressure reduction on leakage in a network at low at peak times of consumption. Accordingly, a network has been modelled using flow measurement method using the minimum and maximum hydraulic analysis software and using the results of model, a time plan has been applied on valve of input network to changes the head of output pressure during the day and on the basis of minimum low pressure in the lowest point of pressure.

● **ESKANDARI, Leila*, JAFARIAN, Ahmad*, RAHIMLOO, Parastoo*, BALEANU, Dumitru**, ***Islamic Azad University, IRAN, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*A Modified and Enhanced Ant Colony Optimization Algorithm for Traveling Salesman Problem*

In this paper an effective modification has been performed on the Ant Colony Optimization algorithm and used for solving traveling salesman problem (TSP). The traveling salesman problem is the one of the famous and important problems and it has been used in the algorithms to analysis its performance in solving the discreet problems. The modified and

enhanced ACO has been used for solving this problem and it's called MEACO. In MEACO the modification has been performed by taking effect of mutation on the global best and personal best of each ant. The personal best is stored for each ant same as the PSO algorithm. Original ACO for discrete problems, mostly trap in the local solutions, but the proposed method has been designed to cover this deficiency and make it more suitable for optimization of discrete problems. The experiment on the set of benchmark problems for Traveling salesman was performed and obtained results showed that MEACO is an effective method in finding the path for TSP.

● **JAFARIAN, Ahmad*, RAHIMLOO, Parastoo*, KHALILI GOLMANKHANEH, Alireza*, BALEANU, Dumitru**, ***Islamic Azad University, IRAN, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*A New Method for Solving Two-Dimensional Bratu Differential Equation*

Artificial neural networks (ANN) are data driven algorithms widely used in solving complicated mathematical problems in various fields of science and engineering. The main purpose of this paper is to derive an approximate interactive method, with combination of Bernstein polynomials and ANNs for the numerical solution of two-dimensional non-linear Bratu differential equations. To this aim, first in the given problem an equivalent truncated bivariate Bernstein polynomial is substituted. A suitable neural network architecture is then used for systematically estimating the unknown series coefficients using a back-propagation supervised learning algorithm which is based on the gradient descent rule. Finally, a practical example is presented to illustrate the theoretical results. The obtained numerical and simulative results reveal that the method is accurate.

● **FARNAD, Behnam, JAFARIAN, Ahmad,** Islamic Azad University, IRAN

*Hybrid Algorithm Based on the Firefly Algorithm and Differential Evolution for Solving Engineering Problems and Data Clustering*

This paper presents a novel and an efficient hybridization of two nature-inspired algorithms Firefly Algorithm (FA) and the Differential evolution (DE) to clustering datasets and optimizing engineering design problems. This method called as HDF, consists of two parts of DE and FA. Firefly algorithm is the population based algorithm which has inspired from light intensity attraction process of a firefly in the nature. Differential evolution is a simple and practical algorithm that uses the evolutionary tools like the selection, recombination and mutation. Besides the privileges of FA and DE, these algorithms have some deficiencies, FA algorithm depends on random directions for the search which increase the CPU time in searching the best solution and DE needs more iteration to seek the suitable solution. In order to overcome these deficiencies, DE and FA algorithms are combined to cover each other weakness. To obtain the required results, the experiment on a set of clustering datasets and engineering optimization problems was performed and the results showed that HDF is a more suitable and efficient method in solving these problems and clustering datasets.

● **JAFARIAN, Ahmad*, ABBASSI, Yeganeh*, TEODORA, Preoteasa C.**, ELENA, Preoteasa**, BALEANU, Mihaela-C.***, BALEANU, Dumitru****,** *Islamic Azad University, IRAN, **University of Medicine and Pharmacy Carol Davila, ROMANIA, ***Mihail Sadoveanu Theoretical High School, ROMANIA, ****Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*The Effect of Smile on Facial Attractiveness by Artifitioal Intelegence*

Nowadays, the way one smiles are considered as an implication of beauty and trust in people. The way one smiles have some direct impact on their visage and look, which, in turn, can raise a sense of trust or distrust, and agreement or disagreement. The impact of wearing appropriate smile may be expressive of some message which will ultimately result in trust and collaboration among people. Researches show that people who wear suitable smile and make use of it at the right time attract more collaboration in reaching their gals. The objective of this article is to investigate the impact of smile on beauty and attractiveness of visage. To accomplish this, the information, including: The Order Of The Photographer, Order For Photos From Front, The Order Of The Smile Photo, Neutral Photo, Smile Photo, Only Smile, Age, Sex, from 2854 people was collected. The obtained information from the photos of these people was prepared through Fuzzy-Feature Extraction method. Through investigation and analysis via k-means and k-medoids methods, the obtained data was clustered. The clustering was performed on the basis of the effect that smile had on their visage. The aim was to distinguish the similar features among these people. These features are associated with the impact of smile only. The results obtained from both clustering methods were analyzed. The people who fell in a common cluster bore more similarities. This way, distinguishing between the trustworthy and the untrustworthy is facilitated in order to contact for collaboration. In the end, the validity of the clustering was assessed via the Silhouette method. The results obtained indicate that the optimum number of clustering could be as many of as 4 clusters. Moreover, k-medoids method proved to be of more efficiency since, in this method, centers of the clusters are picked from the middle with a higher accuracy.

● **JARAD, Fahd*, ABDELJAWAD, Thabet** ,** *Cankaya University, TURKEY, **Prince Sultan University, SAUDI ARABIA

*Generalized Fractional Derivatives and The ρ-Laplace Transform*

In this work, we present the ρ-Laplace transforms for the generalized fractional integrals and derivatives and apply this transform to solve some ordinary differential equations in the frame of the generalized fractional derivatives.

● **KALAYCI, Betul**, **OZMEN, Ayse, KARIMOV, Azar, WEBER, Gerhard-Wilhelm,** Middle East Technical University, TURKEY

*Identification of Systems of Stochastic Differential Equations for Generalized Model Classes in Financial Mathematics Including Investor Sentiment*

A wide literature on mathematical modeling of dynamical processes may be found with deterministic differential equations such as ordinary differential equations (ODE), partial differential equations (PDE), etc., whereby the element of noise is not considered. Since in reality many phenomena are influenced by random noise, the behaviour of noise in differential equations should be described. For that the reason, stochastic differential

equations (SDEs) are required. More generally, these equations are obtained by allowing randomness in the coefficients of differential equations. In this case, an SDE consists of two parts: a drift part where the noise is not included, and a diffusion part which shows the random fluctuation. SDEs rapidly become the most well-known format in which to express mathematical models of such diverse as finance models, neural networks, micro economic systems, and human factors. They are main applications to describe the randomness of a dynamical system today. In a financial system, different kinds of SDEs have been improved to model a specific financial product or class of products. Similarly, economists often want to model problems in a way that integrate the notion that today's choices affect future decisions (which is the drift part) but also allows how the fact that there will be random disturbances which will shift people's states in future periods (which is the diffusion part). Furthermore, economists address several empirical facts regarding the behaviour of indiviual investors, such as how their emotions, opinions, views affect decisions and this constitutes the main subject of behavioral finance. All these emotions, opinions, views and ideas based on a feeling about a situation describe the word Sentiment. In stock markets an economy, the impact of investor sentiment are studied by Behavioral Finance. In this study, we consider on the identification of a system of stochastic differential equations in terms of economics and investor sentiment for generalized model classes. These equations are hard to represent by a computer and hard to resolve. Therefore, we will express them in the simplified manner of approximation both by discretization and multiplicative models based on splines and we construct a multivariate adaptive regression splines (MARS) model, which is a strong method for flexible regression and classification of high-dimensional and nonlinearly structured data. We will provide an example based on real-world data.

● **SAHIN, Aynur, KALKAN, Zeynep, BASARIR, Metin,** Sakarya University, TURKEY

*Iterative Solutions of Nonlinear Volterra Integral Equations with Delay*

It has been shown that the iteration method defined in [1] converges to the solution of a nonlinear Volterra integral equation with delay in a complete metric space. Furthermore, a data dependence result for the solution of this integral equation has been proven.

● **CAKALLI, Huseyin*, KAPLAN, Huseyin**, ***Maltepe University, TURKEY, **Omer Halisdemir University, TURKEY

*A Study on Strong Lacunary Quasi-Cauchy Sequences*

In this paper, the concept of an $N_\theta^2$ quasi-Cauchy sequence is introduced. We proved interesting theorems related to $N_\theta^2$-quasi-Cauchy sequences. A real valued function *f* defined on a subset *A* of *R*, the set of real numbers, is $N_\theta^2$ ward continuous on *A* if it preserves $N_\theta^2$ quasi-Cauchy sequences of points in *A*, i.e. $(f(\alpha_k))$ is an $N_\theta^2$ quasi-Cauchy sequence whenever $(\alpha_k)$ is an $N_\theta^2$ quasi-Cauchy sequences of points in A, where a sequence $(\alpha_k)$ is called $N_\theta^2$ quasi-Cauchy if $(\Delta^2\alpha_k)$ is an $N_\theta$ quasi-Cauchy sequence where $\Delta^2\alpha_k = \alpha_{k+2} - 2\alpha_{k-1} + \alpha_k$ for each positive integer k.

● **KARAGOZ, Derya,** Hacettepe University, TURKEY

*The Modified Range Charts for Monitoring the Contaminated Process*

This study aims to modify the Shewhart and weighted variance methods for monitoring the contaminated skewed process. To construct the control limits of range charts the classic range estimator is replaced with the robust interquartile range. The modified robust methods are compared with the well known methods in terms of their type I risks (p) and the average run length (ARL). To evaluate the R control charts performance we obtain the p and ARL values of the range charts based on classic and robust estimators by using Monte Carlo simulation. The gamma distribution is chosen since it can represent a wide variety of shapes from nearly symmetric to highly skewed. The performance of the proposed range charts is assessed when the Phase I and Phase II data are uncontaminated and contaminated skewed gamma distributed.

● **KARAOGLU, Esra*, YILMAZ, Enes**, MERDAN, Huseyin*, ***TOBB University of Economics and Technology, TURKEY, **DePaul University, USA

*Hopf Bifurcation Analysis of Coupled Two-Neuron System with Discrete and Distributed Delays*

In this study, we investigate the stability and Hopf bifurcation analysis of a coupled two-neuron system involving both discrete and distributed delays. First, we analyze stability of equilibrium point. Choosing delay term as a bifurcation parameter, we also show that Hopf bifurcation occurs under some conditions when the bifurcation parameter passes through a critical value. Moreover, some properties of the bifurcating periodic solutions are determined by using the center manifold theorem and the normal form theory. Finally, numerical examples are provided to support our theoretical results.

● **KARAPINAR, Erdal,** Atilim University, TURKEY

*Fixed Points of Certaing Mappings in the Context of Brianciari Metric Space*

In this talk, we aim to discuss the notion of Brianciari metric space, especially weakness of its topology. Moreover, we discuss the existence of certain operators in the setting Brianciari metric space. The talk will be largely expository.

● **HASHEMI, Mir Sajjad*, INC, Mustafa****, **KARATAS, Esra***, AKGUL, Ali****,** *University of Bonab, IRAN, **Firat University, TURKEY, ***Canakkale Onsekiz Mart University, TURKEY, ****Siirt University, TURKEY

*A Numerical Investigation on Burgers Equation by MOL-GPS Method*

Group preserving scheme for calculating the numerical solutions of the Burgers equation with appropriate boundary and initial conditions is given in this work. Stability of group preserving scheme for Burgers equation is displayed. Numerical results present the efficiency and power of this technique.

● **BAIRAMOV, Elgiz, AYGAR, Yelda, KARSLIOGLU, Dilara,** Ankara University, TURKEY

*Scattering Solutions of Impulsive Discrete Sturm-Liouville Equations*

Let us consider the following impulsive discrete boundary value problem (IDBVP)

$$\begin{cases} a_{n-1}y_{n-1} + b_n y_n + a_n y_{n+1} = \lambda y_n \quad , \quad n \in \mathbb{N}\backslash\{m_0 - 1, m_0, m_0 + 1\} \\ y_0 = 0 \\ y_{m_0+1} = \gamma_1 y_{m_0-1} \\ \Delta y_{m_0+1} = \gamma_2 \nabla y_{m_0-1}, \end{cases}$$

where $a_n,\ b_n \in \mathbb{R},\ m_0 \in \mathbb{N},\ \gamma_1\gamma_2 \neq 0,\ \gamma_1, \gamma_2 \in \mathbb{R}$ and $\Delta y_n := y_{n+1} - y_n,\ \nabla y_n := y_n - y_{n-1}$. In this study, we investigate spectral properties of this IDBVP.

● **KASAR, Omer*,**, KAHRIMAN, Mesud*, GOZEL, Mahmut A.***, *Suleyman Demirel University, TURKEY, **Artvin Coruh University, TURKEY

*A New Multi Stepped Real Impedance Matching Method with Euler Polynomials and Its Application on Transmission Line*

Impedance matching on transmission line is quite important because of transmitting maximum power or electromagnetic waves from source to load. The impedance matching can be defined as to balance real part of the load impedance to characteristic impedance of the transmission line and fit the imaginary part to zero. In the event of mismatching the power transfer became decrease. A large number of impedance matching techniques took part in literature. In this study we propose a new multi stepped real impedance matching technique which is named as Euler Method Real Impedance Matching Technique. In this technic, the reflection equation modelled into Euler function. Then each reflection coefficient of the steps of transmission line defined with Euler Polynomials. Therefore, the characteristic impedance of the steps are calculated. Additionally, we tried the matching method on an arbitrary mismatching problem. The $Z_0$=50 $\Omega$ transmission line, matched to load of $Z_L$=100+$j$0 $\Omega$ in three steps. Then results are reported and compared to mismatching case. The reflection can be decreased roughly 8-10 dB. Consequently the Euler Impedance Matching Method works successfully.

● **KASAR, Omer*,**, KAHRIMAN, Mesud*, GOZEL, Mahmut A.***, *Suleyman Demirel University, TURKEY, **Artvin Coruh University, TURKEY

*A 5.8 Ghz Ism Bant Microstrip Patch Antenna Design and Its Impedance Matching with Euler Method*

Impedance matching antenna is quite important because of maximum power transmitting from source to load. The impedance matching can be defined as to equalization antenna impedance to characteristic impedance of the transmission line. In the event of mismatching the power transfer became decrease. A large number of antenna impedance matching techniques took part in literature. In this study we designed a circular microstrip patch

antenna which works at ISM band of 5.8 GHz. Then the mismatching problem of antenna input impedance solved by Euler Method Multi Stepped Real Impedance Matching Technique which inferred from Euler Equation and Polynomials. By using this technique we defined reflection coefficient for each steps of antenna microstrip feeding line. Therefore, the characteristic impedance of the steps are calculated. In conclusion the antenna input point impedance at around 5.8 GHz is $Z_{antenna}$=36−$j$68 $\Omega$. By shifting this point along the line, whose characteristic impedance is $Z_0$=50 $\Omega$, can be seen real impedance point ($Z_{reel}$ =210 $\Omega$). Then applying three stepped Euler impedance matching method the reflection became decrease from -6 dB to -12 dB with 100 MHz band width. Consequently the Euler Impedance Matching Method works successfully on microstrip circular patch antenna.

● **ALISOY, Hafiz*, KAVURAN, Gurkan**, ATES, Abdullah***, ALAGOZ, B. Baykant***, YEROGLU, Celaleddin***,** *Namik Kemal University, TURKEY, **Firat University, TURKEY, ***Inonu University, TURKEY

*Numerical Modelling of Inaccessible Subsystem Dynamics: An Application for Control Engineering Practices*

This study presents an application note for modelling of inaccessible subsystem dynamics from top level system identification. In some cases, components of sophisticated systems may not be well modelled stand-alone because isolated subsystems may not be useful to model subsystem dynamics emerging from mutual interaction of system components. In such cases, numerical modelling of system components according to top level system modelling can be possible and be effective to obtain satisfactory simulation models. In this paper, we demonstrate an application of subsystem modelling for control engineering practice. Specifically, extraction of a relevant plant model, well characterizing its closed loop control dynamics, may not be always possible because of inaccessible subsystem dynamics. To deal with such complications, we employed two-stage model extraction method. This method allows extraction of fractional order plant models from closed-loop control system models. Results of the method were demonstrated for modelling of experimental rotor test platform.

● **KAVURAN, Gurkan*, ALAGOZ, B. Baykant**, ATES, Abdullah**, YEROGLU, Celaleddin**, ***Firat University, TURKEY, **Inonu University, TURKEY

*A Model Reference Control Scheme by MIT Rule with Fractional Order Sliding Surface*

This study introduces a model reference control approach performing minimization for fractional order sliding surface of reference model tracing error. The proposed method employs the MIT rule to minimize an objective function, which is composed of a fractional order sliding surface of the model error. Conventional model reference control methods mainly use the squared sum of model error as objective function. This study demonstrates utilization of fractional order sliding surface, which can contribute stability of model reference adaptive control methods in the case that the plant model is not definite.

● **GASILOV, Nizami, KAYA, Mujdat,** Baskent University, TURKEY

*A Numerical Method for Solving a Boundary Value Problem for a Class of Interval Differential Equations*

In many real life applications, the behavior of the system is modeled by a boundary value problem (BVP) for a linear differential equation. If the uncertainties in the boundary values, the right-hand side and coefficient functions are considered, then an interval boundary value problem (IBVP) arises. In this study, for such an IBVP, an approach, which is different from the approaches commonly used, is proposed. In the investigated IBVP, the boundary values are intervals. Besides, the right-hand side and coefficient functions are modeled as bunches of real functions. The solution of the problem is also sought as a bunch of functions. The IBVP is interpreted as a set of classical BVPs. Such a classical BVP is constructed by taking a real number from each boundary interval, and a real function from each bunch. The bunch consisting of the solutions of the classical BVPs is de- fined to be the solution of the IBVP. A numerical method is developed to obtain the solution. The complexity of the straightforward method, for a second order differential equation, is $O(n^5)$. Through the investigations, the complexity of the method is reduced to $O(n^2)$. The effectiveness of the proposed approach and the numerical method is demonstrated by test examples.

● **KAYAN, Seyma*,**, MERDAN, Huseyin**,** *Cankaya University, TURKEY, **TOBB University of Economics and Technology, TURKEY

*An Algorithm for Hopf Bifurcation Analysis of a Delayed Reaction-Diffusion Model*

We present an algorithm for determining the existence of a Hopf bifurcation of a system of delayed reaction-diffusion equations with the Neumann boundary conditions. The conditions on parameters of the system that a Hopf bifurcation occurs as the delay parameter passes through a critical value are determined. These conditions depend on the coefficients of the characteristic equation corresponding to linearization of the system. Furthermore, an algorithm to obtain the formulas for determining the direction of the Hopf bifurcation, the stability and period of the periodic solution is given by using the Poincare normal form and the center manifold theorem. Finally, we give several examples and some numerical simulations to show the effectiveness of the algorithm proposed.
Acknowledgments: We would like to express our gratitude to Dr. Serdar Goktepe for his help to numerical simulations.

● **BASKONUS, Haci M.*, BULUT, Hasan**, KAYHAN, Mirac***,** *Munzur University, TURKEY, **Firat University, TURKEY, ***Inonu University, TURKEY

*Some Wave Simulation Properties to the (3+1) Dimensional Kadomtsev-Petviashvili Equation*

In this study, we apply an effective method which is improved Bernoulli sub-equation function method (IBSEFM) to (3+1) dimensional Kadomtsev-Petviashvili equation. It gives some new wave simulations such as complex and exponentiel structures. We check up whether all structures verify the (3+1) dimensional Kadomtsev-Petviashvili model. Then, we plot three and two dimensional surfaces to obtained solutions by using Wolfram Mathematica 9.

● **IRK, Dursun, KESKIN, Pinar,** Eskisehir Osmangazi University, TURKEY

*Numerical Solution of Modified Regularized Long Wave Equation*

The modified regularized long wave (MRLW) equation has the form

$$u_t + u_x + \varepsilon u^2 u_x - \mu u_{xxt} = 0 \tag{1}$$

This equation has a major role in the propagation of nonlinear dispersive waves and many authors have investigated its numerical solution [1], [2], [3], [4]. In this study, the Modified Regularized Long Wave (MRLW) equation is solved numerically by Galerkin finite element method, based on quadratic trigonometric B-spline for the space discretization and Crank Nicholson method for time discretization. Proposed method is investigated on the problems of propagation of single solitary wave and interaction of two solitary waves for MRLW equation. To see the accuracy and efficiency of the method, the error norm $L_\infty$ for the first test problem is computed and results are compared with previous published studies. The three conservation quantities of the motion are calculated to accurate numerical scheme for both of the test problems.

● **KHALIDA, Aissani*, MOUFFAK, Benchohra**,** *University of Bechar, ALGERIA, **University of Sidi Bel Abbés, ALGERIA

*Fractional Integro-Differential Inclusions with State-Dependent Delay*

In this work, we establish sufficient conditions for the existence of mild solutions for fractional integro-differential inclusions with state-dependent delay. The techniques rely on fractional calculus, multivalue mapping on a bounded set and Bohnenblust-Karlin's fixed point theorem.

● **KHALILI GOLMANKHANEH, Ali***, **ASHRAFI, Saleh*, BALEANU, Dumitru**, ***Tabriz University, IRAN, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*Fractal Time Motion on Particle Diffusion*

We have investigated fractal time Langevin and Brownian motion using $F^\alpha$-calculus and shown that the mean square displacement will not vary linearly with time. We have also generalized the classical method of deriving of Fokker-Planck equation to obtain fractal time Fokker-Planck equation.

● **KHALILI GOLMANKHANEH, Alireza***, **BALEANU, Dumitru**, ***Islamic Azad University, IRAN, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*Differential Equations on the Fractal Tartan*

Recently, the $F^\alpha$-calculus is built for the functions with the fractals support. $F^\alpha$ -calculus is used to model the anomalous diffusion on the fractal space. Using $F^\alpha$ -calculus the generalized Maxwell and Schrödinger equations are suggested. The non-local fractal derivatives are defined on the Cantor sets and corresponding linear differential equation have been solved. In

this work, we generalized the local and non-local fractal derivative for case of fractal Tartan. More, we have solved the linear non-local differential equations on the fractal Tartan.

● **KHAN, Amir*,**, ZAMAN, Gul*, ALGAHTANI, Obaid***, RASHIDI, M. M.****,** *University of Malakand, PAKISTAN, **University of Swat, PAKISTAN, ***King Saud University, SAUDI ARABIA, ****Tongji University, CHINA & ENN-Tongji Clean Energy Institute of Advanced Studies, CHINA

*Exact Solution of Unsteady Fractional Jeffrey Fluid Produced by a Plate Between Two Side Walls*

This paper presents some new exact solutions corresponding to three unsteady flow problems of a generalized Jeffrey fluid produced by a flat plate between two side walls perpendicular to the plate. The fractional calculus approach in the governing equations is used. The exact solutions are established by means of the Fourier sine transform and discrete Laplace transform. The series solution of velocity field and the associated shear stress in terms of Fox H-functions, satisfying all imposed initial and boundary conditions, have been obtained. The similar solutions for ordinary Jeffrey fluid, performing the same motion, appear as limiting case of the solutions are obtained here. Also, the obtained results are analyzed graphically through various pertinent parameter.

● **KHOJASTEH, Farshid,** Islamic Azad University, IRAN

*Application of Manageable and Strong Manageable Functions in the Set of Multi-Valued Mappings*

In this work, we want to investigate and improve the concept of manageable functions and $\widehat{Man}(R)$-contractions in order to extend the theory of multivalued contractions and fixed point results. As some applications, we generalize Liu's and Du's results as simple corollaries of our main result.

● **KILINC, Emine, TURKOGLU, Duran,** Gazi University, TURKEY

*Some Fixed Point Results for Caristi Type Mappings in Modlar Metric Spaces*

In this paper we give Caristi type fixed point theorem incomplete modular metric spaces. Moreover we give a theorem which can be derived from Caristi type. Also an application fort he bounded solution of functional equations is investigated.

● **KIRACI, Ali*, YURTSEVEN, Hamit**,** *Cankaya University, TURKEY, **Middle East Technical University, TURKEY

*Analysis of the Integrated Intensity of the Central Peaks Calculated as a Function of Temperature in the Ferroelectric Phase of Lithium Tantalate*

The integrated intensity of the central peak is calculated as a function of temperature in the ferroelectric phase ($T<T_C$) of nearly stoichiometric $LiTaO_3$. This calculation is performed using the temperature dependence of the order parameter obtained from the mean field theory (MFT) at temperatures lower than the transition temperature $T_C$ ($T_C$= 963 K) of this crystal. The calculated values of the order parameter (squared) are fitted to the integrated intensity of

the central peaks as observed from the Raman and Brillouin scattering experiments reported in the literature at the ferroelectric phase of nearly stoichiometric $LiTaO_3$. Our results are in good agreement with the observed behavior of $LiTaO_3$ crystal.

● **KIRACI, Ali*, YURTSEVEN, Hamit**,** *Cankaya University, TURKEY, **Middle East Technical University, TURKEY

*Calculation of the Damping Constant, Relaxation Time and the Activation Energy of Raman Modes in Stoichiometric $LiTaO_3$*

We calculate the temperature dependence of the damping constant of the $a^*$ and the lowest two Raman modes of $A_1(TO)$, $A_1(TO_1)$ and $A_1(TO_2)$ in the ferroelectric phase of nearly stoichiometric $LiTaO_3$ (SLT) ($T_C$= 963 K). This calculation is carried out using the pseudospin-phonon coupled model and the energy fluctuation model by considering that the observed Raman frequencies of these modes are related to the order parameter below the transition temperatures $T_C$ in this SLT crystal. We then obtain the relaxation time as a function of temperature by means of the fitting procedure using the observed data given in the literature. We also deduce the activation energy of the nearly stoichiometric lithium tantalite crystal below the transition temperature $T_C$. The extracted values of the activation energies of this crystal are compared with the $k_BT_C$ value. Our calculated values of the damping constant, relaxation time and the activation energy show that the two models (pseudospin-phonon coupling and the energy fluctuation models) can be used to explain the mechanism of the phase transition of SLT crystal.

● **KOKSAL, Ece, OZMEN, Ayse, WEBER, Gerhard-Wilhelm,** Middle East Technical University, TURKEY

*Modeling of Exchange Rates by Multivariate Adaptive Regression Splines and Comparison with Classical Statistical Methods*

Economic factors like inflation, interest rates and exchange rates are among the leading indicators of a country's relative level of economic health. With the help of technological improvements and global requirements, trading volume and a wide range of commerce network, exchange rates play a vital role in economics and finance since a higher exchange rate may result in a lower balance trade of a country, whereas a lower rate may cause an increase. Inflation, interest rates, domestic money supply growth, a country's balance of payments' size and trend, a country's economic growth, dependency on outside sources and central bank intervention are factors which affect an exchange rate. Since many dependent and independent factors affect exchange rates, it is difficult to predict them. In areas of application, data mining is frequently used for decision support, financial forecasting, marketing strategy, prediction, etc. The method of data mining and machine learning is applied to analyze and forecast the future behavior of such complex systems. Modeling and prediction of exchange rates are still a challenge, although mathematicians, economists and statisticians have worked to reach a model with a superior forecasting ability for many years. Therefore, in this study, we aim to generate mathematical models to forecast the monthly Turkish Lira (TRY)/US Dollar (USD) and Turkish Lira (TRY)/Euro (EUR) exchange rates via data mining tools. For this purpose, we apply a flexible model Multivariate Adaptive Regression Splines (MARS) and widely used models Linear Regression (LR) and Support Vector Regression (SVR). In this study, MARS, LR and SVR models are applied on

TRL/USD and TRL/EUR exchange rate data sets in the period of 1/1/2007 and 30/4/2015, then the results of these models are compared.

● **DOGAN DURGUN, Derya, KONURALP, Ali,** Manisa Celal Bayar University, TURKEY

*Fractional VIM Composed with Jumarie Type Derivative for Time-Fractional Nonlinear Functional PDEs having Proportional Delays*

In this paper, time-fractional nonlinear PDEs with proportional delays are solved by fractional variational iteration method taking into account Jumarie fractional derivative. The numerical solutions which are calculated by using this method, are better than those obtained by homotopy perturbation method with same data set and approximation order. These results are supported by compared tables and graphics.

● **PARLAK, A. Evren*, SARAC, Kamuran**, ALAYUNT, N. Omer***, KOPARIR, Pelin****, CINAR, Serap*, OREK, Cahit*****, KOPARIR, Metin*,** *Firat University, TURKEY, **Bitlis Eren University, TURKEY, ***Usak University, TURKEY, **** Forensic Medicine Institute, TURKEY, *****Kastamonu University, TURKEY

*Density Functional Calculations of the Electronic Structure of New Bis α-Aminoalkylphosphinic Acid Derivative*

α-Aminoalkylphosphinic acids are considered structural analogs of α-amino acids and possess potential biological activities applicable to antibiotics, enzyme inhibitors, pharmacological agents, antiviral agents, and herbicides. This work presents the chemical reactivity of (2,2-dimethylpropane,1,3diylbis{imino[(2hydroxyphenyl)methanediyl]})bis (phosphinic acid) **(I)** by quantum chemical calculations. Computational study on molecular properties of **I** is presented using density functional theory (DFT) with B3LYP functional and 6-31G(d,p) basis set. The chemical reactivity parameters i.e. global and local reactivity descriptors and molecular electrostatic potential (MEP) map, were determined and discussed.

● **KOPRUBASI, Turhan,** Kastamonu University, TURKEY

*Principal Functions of Discrete Dirac Equations with Quadratic Eigenparameter in Boundary Condition*

Let the boundary value problem,

$$\begin{cases} a_{n+1}y_{n+1}^{(2)} + b_n y_n^{(2)} + p_n y_n^{(1)} = \lambda y_n^{(1)} \\ a_{n-1}y_{n-1}^{(1)} + b_n y_n^{(1)} + p_n y_n^{(2)} = \lambda y_n^{(2)} \end{cases}$$

$$(\gamma_0 + \gamma_1\lambda + \gamma_2\lambda^2)y_1^{(2)} + (\beta_0 + \beta_1\lambda + \beta_2\lambda^2)y_0^{(1)} = 0$$

is considered where $(a_n)$, $(b_n)$, $(p_n)$, $(q_n)$ are complex sequences for $n \in \mathbb{N}$, $\gamma_i$ , $\beta_i \in \mathbb{C}$ for $i = 0,1,2$ and $\lambda$ is a eigenparameter. In this study, several spectral properties of principal functions of the above boundary value problem are mentioned under the condition

$$\sum_{n=1}^{\infty} e^{\varepsilon n^{\delta}}(|1 - a_n| + |1 + b_n| + |p_n| + |q_n|) < \infty$$

where $\epsilon > 0$ and $\delta \in \left[\frac{1}{2}, 1\right]$.

● **KORKUT UYSAL, Sila Ovgu*, GUCUYENEN, Nurcan**,** *Izmir Katip Celebi University, TURKEY, **Izmir Institute of Technology, TURKEY

*A Linearization Method to Benjamin-Bona-Mahony Equations: Analysis and Applications*

Benjamin-Bona-Mahony(BBM) equation is a nonlinear dispersive equation modeling the propagation of small-amplitude long waves. The main purpose of this article is to solve BBM equation numerically using a linearization technique. In addition, the convergence of the proposed method for BBM equation is analyzed. The efficiency of the method is presented on several numerical examples.

● **OZTURK, Mahpeyker, KOSAL, Isıl A. ,** Sakarya University, TURKEY

*Common Fixed Point Theorems in Elliptic Number Valued Metric Spaces*

Recently, Azam et al. introduced complex valued metric spaces and established the existence of fixed point theorems under the contraction condition. In this study, we defined new spaces called the elliptic number valued metric spaces. Also, sufficient condition for the existence of common fixed points of a pair of mapping satisfying contractive type conditions are obtained. Elliptic numbers are generalized form of complex and so real numbers. Thus, the each result that will be obtained form of the elliptic number valued metric spaces will be the generalized forms of the results known in the literature for the real and complex valued metric spaces.

● **BAYKASOGLU, Adil, KUBUR OZBEL, Burcu,** Dokuz Eylul University, TURKEY

*Comparison of Grey and ARIMA Models for Production Forecasting In Marble Industry*

Turkey is one of the leading countries in the marble industry due to having 40% potential of marble reserves of the entire world. Yearly marble production amount tends to increase depending on the number of marble exports. In this study, marble production amount in Turkey between 2003 and 2015 is analyzed. Using these past data, first-order and one-variable grey differential equation model (GM(1,1) model) and autoregressive integrated moving average model (ARIMA model) are built to forecast future production amount of marble for the periods 2016 to 2025. Although there are several forecasting techniques, selection of the most appropriate technique has crucial importance. For these reasons, different performance measures are used to determine the accuracy of the prediction models. These methods are mean squared error, mean absolute deviation and mean absolute percentage error that is applied to the forecasting results. Results show that the implemented methods are efficient.

● **BAYKASOGLU, Adil, KUBUR OZBEL, Burcu,** Dokuz Eylul University, TURKEY

*An Interval Programming Model for Balancing Assembly Lines*

The growing trend in the mathematical methods requires modelling of all relevant vague or uncertain information involved in a decision problem. In most of the real-world situations, due to the variety of reasons some of the input parameters of the model coefficients are not

exactly known but given by intervals of their possible values. In this study, simple assembly line balancing problem with interval task times is considered. The objective is to assign the tasks to workstations while minimizing the number of workstations by satisfying precedence and cycle-time constraints. To find the optimal solution, interval linear programming method is used and evaluated on benchmark instances. Computational results show that the proposed method is able to handle uncertainty and to provide acceptable solutions.

● **KUCUKADA, Kurtul, KALYONCU, Burce,** Marmara University, TURKEY

*Optimum Sampling Times and Measurement Locations for Tubular Reactors*

Mathematical models can be used to optimize and design of processes. They can also be used for on-line and off-line analysis of the measured data in order to efficiently control the existing process. In the present work, the steady state and dynamic mathematical models were used to adjust the optimum sampling times and measurement locations for tubular reactors. The presence of advection, dispersion and convection were taken into account in the model equations. The results were presented for different dimensionless numbers such as Peclet, Damköhler, Hatta and Courant numbers affecting the behaviour of the model.

● **KUCUKSEYHAN, Tugba*, KARASOZEN, Bulent*, UZUNCA, Murat**, ***Middle East Technical University, TURKEY, **University of Turkish Aeronautical Association, TURKEY

*Model Order Reduction for Pattern Formation of FitzHugh-Nagumo Equation*

We investigate reduced order solutions for the computation of Turing patterns of diffusive FHN equation [1]. We use symmetric interior penalty Galerkin finite elements for space discretization, average vector field method for time discretization. We compare the accuracy and speed-up of the reduced order solution and the finite element full order solution computed using proper orthogonal decomposition (POD), discrete empirical interpolation method (DEIM) [2] and dynamic mode decomposition method (DMD) [3] for spot and labyrinthic-like patterns.

● **KURU, Neslihan, OZTURK, Mahpeyker,** Sakarya University, TURKEY

*Common Fixed Point Theorems for Multivalued Mappings in Complex Valued b- Metric- Like Spaces*

The main purpose of this work is to introduce the notion of complex valued b-metric- like spaces by improving the conditions of complex valued b-metric space and metric-like space. Also, we prove some common fixed point results of multi-valued mappings satisfying rational expressions on complex valued b-metric-like space.

● **ABBO, Khalil K.*, LAYLANI, Yoksal A.**, KHUDHUR, Hisham M.*, *** University of Mosul, IRAQ, **University of Kirkuk, IRAQ

*A New Spectral Conjugate Gradient Algorithm for Unconstrained Optimization*

In this research, we developed a new search direction in the conjugate gradient algorithms by using combined convex property. The developed algorithm becomes converged by assuming

some hypothesis. The numerical results show the efficiency of the developed method for solving test unconstrained nonlinear optimization problems.

● **LIANG, Chunhao, CAI**, **Yangjian,** Soochow University, CHINA

*Producing Intensity and Degree of Coherence Lattices with Complex Optical System*

Owning to a multitude of applications to optical communications, metrology, material processing, speckle-free image transfer, atom cooling, atomic recoil lasing and so on, the partially coherent beams have enjoyed a renaissance. In 1978, Wolf and Collett proposed the classical partially coherent beam-Gaussian Schell-model (GSM) beam, and it holds the propagation-invariant for the DOC and intensity, which is significant for application to distortion-less free-space image transfer. After that, many researchers studied the GSM beam in theoretically and experimentally and various different kinds of the partially coherent beams spring up. The correlated functions (namely DOC) of these partially coherent beams mentioned above are the conventional Gaussian distribution, so we term them the partially coherent beams with conventional correlated function. Several years ago, Gori et al. discussed the sufficient conditions for devising genuine correlation functions of scalar and electromagnetic partially coherent beams. As a result, the partially coherent beams with nonconventional correlation functions (i.e., non-Gaussian correlated Schell-model functions) are studied far and wide. Due to the non-Gaussian distributions of DOC, these beams hold extraordinary properties. The applications of these beams with non-Gaussian correlated Schell-model functions have potential to be scaled up. In this case, modulation of the DOC (correlated function) of the partially coherent beam becomes one of the hot research fields recently. However, for the partially coherent beam, we usually modulate the intensity or the DOC separately. In this manuscript, with complex optical system, we can produce the intensity and degree of coherence lattices in the source, which also certifies that we can modulate both of them simultaneously. What's more, we carry out experimental generation of the proposed beam and explore its extraordinary properties. We suggest that the beam can find applications to free-space optical communications and optical manipulation.

● **DUCHARNE, Benjamin*, LITAK, Grzegorz**, BIN, Zhang*****, *Laboratoire de Génie Electrique et Ferroélectricité of INSA de Lyon, FRANCE, **Lublin University of Technology, POLAND & AGH University of Science and Technology, POLAND, *** Shandong University, CHINA

*Multiscale Characterization and Model for the Dynamic Behavior of Ferroelectric Materials Using Fractional Operators*

Fractional operators are well adapted to model dynamic dielectric losses of ferroelectric materials. Where usual integer derivative operators are always limited to a relatively weak frequency bandwidth, an approach based on fractional derivatives provides good simulation results even beyond working frequency of industrial systems. In this article, we establish the link between a high excitation (> 2 kV/mm), weak frequency (< 100 Hz) dynamic dielectric fractional hysteresis model and the weak excitation stress level (< 5 V/mm) but large frequency bandwidth (40 Hz < f < 40 MHz) well known dielectric permittivity fractional models (Cole-Cole model and Havriliak–Negami). The good comparisons simulation/measure obtained considering same sample and same dynamic parameters (fractional order together with nonlinear dry friction parametrization) in both cases, allows attributing same physical origin of the dielectric losses simulated here (the dielectric relaxation). It allows too, to limit

the ferroelectric dynamic characterization to the impedance analyser measure (where all the model parameters can be set) and to anticipate the high electrical amplitude stress behaviour in simulation.

● **LIU, Lin,** Soochow University, CHINA

*Decomposition of a Hermite-Gaussian Correlated Schell-Model Beam*

Mode representation can provide physical insight and computational simplification into the propagation of partially coherent beam. In this work, we introduced the novel complex Gaussian representation to partially coherent beams with nonconventional correlation functions. As an example, the Hermite-Gaussian correlated Schell-model (HGCSM) beam were expanded in complex Gaussian pseudo-modes and an addressable P-distributions is obtained. Based on the obtained decomposition form, we derived the CSD expression for a HGCSM beam propagating in uniaxial crystal and acquire the birefringent effect on the self-splitting properties of HGCSM beam.

● **LIU, Xiaoting,** Hohai University, CHINA

*A Variable-Order Fractal Derivative Model for Anomalous Diffusion*

This report pays attention to develop a variable-order fractal derivative model for anomalous diffusion. Previous investigations have indicated that the medium structure, fractal dimension or porosity may change with time or space during solute transport processes, results in time or spatial dependent anomalous diffusion phenomena. Hereby, we introduce a variable-order fractal derivative diffusion model, in which the index of fractal derivative depends on temporal moment or spatial position, to characterize the above mentioned anomalous diffusion (or transport) processes. Compared with other models, the main advantages in description and the physical explanation of new model are explored by numerical simulation. We also make discussion on computational efficiency, diffusion behavior and heavy tail phenomena of the new model and variable-order fractional derivative model.

● **LUO, Albert C. J.*, GUO, Yu**,** *****Southern Illinois University Edwardsville, USA**,** **Midwestern State University, USA

*Periodic Motions to Chaos in Pendulum*

It is not easy to find periodic motions to chaos in a pendulum system even though the periodically forced pendulum is one of the simplest nonlinear systems. However, the inherent complex dynamics of the periodically forced pendulum is much beyond our imaginations through the traditional thought of the linear dynamical systems. Until now, we did not know complex motions of pendulum yet. What are the mechanism and mathematics of such complex motions in the pendulum? The results presented herein give a new view of complex motions in the periodically forced pendulum. Thus, in this paper, periodic motions to chaos in a periodically forced pendulum are predicted analytically by a semi-analytical method. The method is based on discretization of differential equations of the dynamical system to obtain implicit maps. Using the implicit maps, mapping structures for specific periodic motions are developed, and the corresponding periodic motions can be predicted analytically through such mapping structures. Analytical bifurcation trees of periodic motions to chaos are obtained, and the corresponding stability and bifurcation analysis of periodic motions to chaos are

carried out by eigenvalue analysis. From the analytical prediction of periodic motions to chaos, the corresponding frequency-amplitude characteristics are obtained for a better understanding of motions complexity in the periodically forced pendulum. Finally, numerical simulations of selected periodic motions are illustrated. The non-travelable and travelable periodic motions on the bifurcation trees are discovered. Through this investigation, the periodic motions to chaos in the periodically forced pendulums can be understood further. Based on the perturbation method, one cannot achieve the adequate solutions presented herein for periodic motions to chaos in the periodically forced pendulum.

● **DEMIR, Eren, GUNES, Filiz, MAHOUTI, Peyman,** Yildiz Technical University, TURKEY

*Prediction of Scattering Parameter Characteristics of a Microwave Transistor using Artificial Neural Networks*

Transistor is one of the core elements of modern RF/microwave systems and modelling of a simple, fast, accurate, reliable transistor is of special importance in microwave technology which is needed to be used in the massive computational tasks during simulation, optimization, and statistical analyses for the reliable designs. In recent years, advances in computational sciences make the Prediction tools possible to generalize the highly nonlinear input–output relations using small sized data sets. Back-Propagation Neural Networks (BPNNs) have been used for the nonlinear interpolation using the measured/simulated data for creating a fast, accurate, and reliable model for both active and passive microwave devices [1-8]. Herein, by using BPNNs it is aimed to create a black box model of a microwave transistor for predicting the scattering parameter characteristics of the transistor in a wide range of DC bias conditions. For this mean, a high technology transistor BFP181 had been chosen which its wide range measured scattering parameters had been provided by the manufacture company [9]. By using these measured results a training and test data sets had been created for making a BPNNs based perdition model of scattering parameters. Furthermore, the data given by the manufacturers had been enrich by dividing the given DC bias conditions to sub regions for increasing the accuracy of the perdition with enriched data. Thus by this mean, a fast and high accurate method had been proposed for the prediction of scattering parameter characteristics of a microwave transistor.

● **MAIZA, Mohammed*,**,***, BENYETTOU, Mohamed**,***,** *University Hassiba Benbouali, ALGERIA, **University of Sciences and Technologies Mohamed Boudiaf, ALGERIA, ***Laboratory of Modeling and Optimization of Industrial Systems, ALGERIA

*Classification of Microarray Data Using Fly Algorithm*

The process of microarray analysis can be defined as the set of methods and tools to quantitatively describe the contents of a data. It is generally divided into several stages: acquisition, scanning, preprocessing, segmentation, classification and interpretation. Consideration of all these phases clearly impacts on the quality of processing tasks and the execution time. In this paper, we look at the problem of classification using fly algorithm.

● **MARINO, Giuseppe,** Università della Calabria, ITALY

*Midpoint Rule for Quasi-Nonexpansive Mappings*

Starting by a classical Eulero midpoint rule to construct a polygonal approximating a solution of an ordinary differential equations, we propose an algorithm to approximate a fixed point for nonexpansive mappings.

● **MARKOWSKI, Konrad A. ,** Warsaw University of Technology, POLAND

*Classes of Digraphs Structures with Weights Corresponding to One-Dimensional Fractional Systems*

In this paper the first classification of digraphs structures D corresponding to one-dimensional positive and standard fractional continuous-time and discrete-time systems has been presented. It was found that digraph structures created can be divided into three classes with different feasibility for different polynomials. Additional two cases of possible input-output digraph structure was investigated and discussed. The proposed method was discussed and illustrated with some numerical examples.

● **MARKOWSKI, Konrad A. ,** Warsaw University of Technology, POLAND

*Fractional Quasi-Positive Realisation of Externally Positive Fractional Discrete-Time Systems*

The realisation problem of quasi-positive fractional discrete-time system described by the transfer matrix is a very complex problem. This paper consider the new category of quasipositive state space models. The method of the determine minimal realisation of one-dimensional fractional quasi-positive discrete-time linear system using digraphs theory D has been also presented. For the proposed method, all possible digraphs structures was determined. The proposed method was discussed and illustrated with some numerical examples and simulations.

● **MARKOWSKI, Konrad A. , HRYNIOW, Krzysztof,** Warsaw University of Technology, POLAND

*Method for Finding A Set of (A, B, C, D) Realisations for Fractional-Order SIMO and MISO 1-D Dynamic Systems*

In the paper presented is a method allowing for determination of a set of (A, B, C, D) realisations for fractional-order dynamic systems. Proposed method is an extension of previously proposed algorithm that was used to determine realisations of fractional-order 1D single-input single-output (SISO) dynamic systems. Method proposed in the paper can be also used for both single-input multiple-output (SIMO) and multiple-input single-output (MISO) fractional dynamic systems. The main advantage of the method over canonical forms is that the algorithm finds a set of realisations, not just a single realisation. Also, the solutions found tend to be minimal in terms of size of state matrix A. Additionally, the method allows for the possibility of obtaining a set of state matrices directly from digraph form of the system and can be efficiently paralleled allowing for using it as fast GPGPU computer algorithm. Proposed method is presented in pseudo-code and illustrated with numerical example.

● **MERSIN, Mehmet A.*, IRK, Dursun**,** *Aksaray University, TURKEY, **Eskisehir Osmangazi University, TURKEY

*Solving Modified Equal Width Equation Using Cubic B-spline Quasi-Interpolation*

In this paper modified equal width equation solved numerically. In the presented numerical method cubic B-spline quasi interpolation used for space integration and Crank Nicolson method used for the time integration. Two test problems, propagation of a solitary wave and interaction of two solitary waves, are used to examine the study. In order to determine the conservation properties of the proposed algorithm, the three conservation quantities of the motion are calculated.

● **MOHAMMED, Debakla, FATIMA, Khedar, MOHAMED, Salem,** University of Mustapha Stambouli, ALGERIA

*A Fuzzy Logic Method for MRI Brain Segmentation*

Segmentation of medical imaging is useful for extracting information about the status of different tissues, different organs and other parts of the body. Brain image segmentation is one of the most important parts of clinical diagnostic tools. In this paper a new automatic and intelligent clustering approach is proposed for the segmentation of brain MRI images using Fuzzy logic method. The proposed approach is a variation of LAMDA algorithm (Learning Algorithm for Multivariable Data Analysis). The experimental results show the efficient and robust performance of these algorithms. Moreover, the proposed algorithm is more robust and effective against noise, when compared with the traditional Fuzzy C-Means algorithm (FCM).

● **MOSTEPHA, Naceri*, AMIR, Elhaffaf**,** *Economics, Commercial and Management Sciences, Preparatory School of Oran, ALGERIA, **Oran University, ALGERIA

*Existence and Nonexistence of Positive Solutions for Singular nth-Order Three-Point Nonhomogeneous Boundary Value Problem*

In this article, we consider the boundary value problem $u^{(n)}(t) + f\big(t, u(t)\big) = 0,\ 0 < t < 1,$ subject to the boundary conditions $u(0) = u'(0) = 0, \dots\dots, u^{(n-3)}(0) = u^{(n-2)}(0) = 0$ and $u^{(n-2)}(1) - \alpha u^{(n-2)}(\eta) = \lambda$. In the setting, $0 < \eta < 1$ and $\alpha \in [0, \frac{1}{\eta})$ are constants and $\lambda \in [0, +\infty)$ is parameter. By placing certain restrictions on the nonlinear term f, we prof the existence and nonexistence of at least one positive solution to the boundary value problem with the use of the Krasnosel'skii fixed point theorem. The novelty in our setting lies in the fact that $f(t, u)$ may be singular at $t = 0$ and $t = 1$. We conclude with examples illustrating our results obtained in this paper.

● **MOUSSA, Anoune, ZEROUAL, Aouachria,** University of Batna1, ALGERIA

*Accelerating Numerical Computations in Slow Iterative Loops Using the Secant Method*

In most scientific and engineering research, scientists usually resort to numerical calculations to solve problems if analytical solutions are not available. In the numerical calculations, the algorithms of these problems usually employ various forms of iterative loops, amongst which is replacing one of the input values in the subsequent iteration by an equivalent output value

in the previous iteration. However, in some scenarios, this procedure may result in a very slow convergence, and would therefore require a very long time to complete the numerical computation, particularly if high-precision results are sought. In this work, we use the secant method to accelerate the numerical computation which employs the above-mentioned iteration form. The new version of this form enables us to reduce the number of iterations very effectively. In order to clarify the effectiveness of this new form, we include in this work some examples for which the convergence is very slow, and show how the number of iteration is reduced by a factor of more than a thousand.

● **MUGLIA, Luigi,** University of Calabria, ITALY

*Approximations on Non-Self Monotone Operators*

We talk about the approximation of common zeros of non-self inverse strongly monotone operators defined on a closed convex subset C of a Hilbert space H. For a non-self family of operators, we introduce an iterative algorithm without relying on projections. Approximation of common fixed points for finite families of non-self strict pseudo contractions in the sense of Browder-Petryshyn is also obtained. The novelty of our algorithm is that the coefficients are not given a priori and no assumptions are made on them, but they are constructed step by step in a natural way.

● **MULAYIM, Gulden*, KARASOZEN, Bulent**, KUCUKSEYHAN, Tugba**, UZUNCA, Murat***,** *Adıyaman University, TURKEY, **Middle East Technical University, TURKEY, ***University of Turkish Aeronautical Association, TURKEY

*Reduce Order Modeling for Reaction-Diffusion Equations with Cross Diffusion*

We consider reaction-diffusion equation with cross diffusion of the form [1]:

$$\frac{\partial u}{\partial t} = D_{11}\Delta u + D_{12}\Delta v + f(u,v)$$
$$\frac{\partial v}{\partial t} = D_{21}\Delta u + D_{22}\Delta v + g(u,v)$$

where $f(u,v)$ and $g(u,v)$are the nonlinear functions, $D_{11}$, $D_{22}$ are diffusion coefficients, and $D_{12}$, $D_{21}$ are cross diffusion coefficients. The coupled PDE is discretized in space by the discontinuous Galerkin method (dG) and in time by the semi-implicit Euler method to obtain the full order model (FOM) solutions. Because formation of pattern require long time computation, we apply reduced order modeling (ROM). We compare three different ROM techniques; the proper orthogonal decomposition (POD),dynamical mode decomposition (DMD) and discrete empirical interpolation method (DEIM). The ROM and FOM solutions are compared with respect to accuracy and efficiency.

● **MUSTAFA, Muhammad I. ,** University of Sharjah, UNITED ARAB EMIRATES

*Energy Decay in a Quasilinear System with Finite and Infinite Memories*

In this paper we consider the following quasilinear system of two coupled nonlinear equations with both finite and infinite memories

$$\begin{cases} |u_t|^{\rho}u_{tt} - \Delta u - \Delta u_{tt} + \int_0^t g_1(s)\Delta u(t-s)ds + f_1(u,v) = 0 \\ |v_t|^{\rho}v_{tt} - \Delta v - \Delta v_{tt} + \int_0^{\infty} g_2(s)\Delta v(t-s)ds + f_2(u,v) = 0 \end{cases}$$

and investigate the asymptotic behaviour of this system. We use the multiplier method to establish an explicit energy decay formula. Our result allows a wider class of relaxation functions and provide more general decay rates for which the usual exponential and polynomial rates are only special cases.

● **BAIRAMOV, Elgiz*, KIR ARPAT, Esra**, MUTLU, Gokhan**,** *Ankara University, TURKEY, **Gazi University, TURKEY

*Spectral Properties of Non-selfadjoint Sturm-Liouville Operator with Operator Coefficient*

In this study, we consider the operator $L$ generated in $L_2(R_+,H)$ by the differential expression

$$L(Y) = -Y'' + Q(x)Y, 0 < x < \infty, \quad (1)$$

with the boundary condition $Y(0) = 0$, where $Q(x)$ is a non-selfadjoint, completely continuous operator in $H$ for each $x \in (0,\infty)$. Here $H$ is a seperable Hilbert space, $B(H)$ denotes the space of bounded operators in $H$ and $L_2(R_+,H)$ denotes the space of square-integrable, strongly-measurable vector-valued functions defined on $(0,\infty)$. In particular, we find some special solutions of this equation including Jost solution, then investigate the point spectrum of $L$ under certain conditions on $Q(x)$. We obtain the resolvent of $L$, if $Q(x)$ is quasi-selfadjoint i.e. there exists $P \in B(H)$ such that $P^{-1} \in B(H)$, $P$ is positive, selfadjoint and $Q^*(x) = PQ(x)P^{-1}$ for every $x \in (0,\infty)$. Under this assumption we investigate the spectral singularities of $L$.

● **MUTUK, Halil,** Ondokuz Mayis University, TURKEY

*Runge-Kutta Approach to Quantum Harmonic Oscillator*

In this paper, we studied numerical solution of Quantum Harmonic Oscillator (QHO) by 4th order Runge-Kutta method. We solved radial Schrödinger equation and obtained eigenfunctions and energy eigenvalues for odd and even states according to the symmetry of the potential.

● **MUTUK, Halil, GUMUS, Hasan, ERTURK, Vedat S. ,** Ondokuz Mayis University, TURKEY

*Runge-Kutta Method for Coulomb Potential in Schrödinger Equation*

In this paper, we solved Schrödinger equation with Coulomb potential by 4$^{th}$ order Runge-Kutta method. We studied Hydrogen atom within the context of radial Schrödinger equation with an effective potential which depend on orbital an-gular momentum,l. We obtained wave functions and energy eigenvalues for different orbital angular momentum values.

● **NALCACI, Gamze**, **ERMIS, Muammer, OZMEN, Ayse, WEBER, Gerhard-Wilhelm,** Middle East Technical University, TURKEY

*Long-Term Load Forecasting - Comparison of Models Based on MARS, ANN and SVR Methods*

Electrical energy has become a vital need in daily life by thrived technologies day by day. The addition of electrical devices, such as high-level personal computers, electric vehicles, etc., to power systems is increasing the electrical load demand and obliges people from sales, marketing, manufacturing divisions of every industry, and from planning departments to model and represent power systems. In the light of this information, load forecasting is becoming a very important topic for governments in deregulated economies. Mid-term and long-term results of load forecasting obtained by load-forecasting techniques determine the size of governmental investment budgets. There are several forecasting techniques in the literature for load-forecasting applications. In this paper, for the first time, Multivariate Adaptive Regression Splines (MARS), Artificial Neural Network (ANN) and Support Vector Regression (SVR) techniques are used for the establishment of load-forecasting models of the Turkish Electricity System, including wind, humidity, load-of-day type of the year (holiday, summer, week day, etc.) and temperature data. By the comparison of these models, we show that MARS gives more accurate and stable results than ANN and SVR.

● **NEZIR, Veysel,** Kafkas University, TURKEY

*$c_0$ Can be Renormed to Have the Fixed Point Property for Affine Nonexpansive Mappings*

For $x = (\xi_k)_k \in c_0$ , define

$$\|x\| := \lim_{p\to\infty} \sup_{k\in\mathbb{N}} \gamma_k \left(\sum_{j=k}^{\infty} \frac{|\xi_j|^p}{j}\right)^{\frac{1}{p}}$$ where $\gamma_k \uparrow_k 1, \gamma_k$ is strictly increasing.

We prove that when $\gamma_1 > \frac{2}{3}$ , $(c_0, \|\cdot\|)$, has the fixed point property (FPP) for affine $\|\cdot\|$-nonexpansive self-mappings.

● **NEZIR, Veysel, MUSTAFA, Nizami,** Kafkas University, TURKEY

*Recent Developments in Renorming $c_0$ and Fixed Point Property for Affine Nonexpansive Mappings*

P.K. Lin gave the first example of a non-reflexive Banach space $(X, \|\cdot\|)$ with the fixed point property (FPP) for nonexpansive mappings and showed this fact for $(\ell^1, \|\cdot\|_1)$ with the equivalent norm $\|\cdot\|$ given by

$$\|x\| = \sup_{k\in N} \frac{8^k}{1+8^k} \sum_{n=k}^{\infty} |x_n|, \text{for all } x = (x_n)_{n\in\mathbb{N}} \in \ell^1 .$$

NEZIR wondered $(c_0, \|\cdot\|_\infty)$ analogue of P.K. Lin's work and recently gave positive answer if mappings are affine nonexpansive. In his work, for $x = (\xi_k)_k \in c_0$ , he defined

$$\|x\| := \lim_{p\to\infty} \sup_{k\in N} \gamma_k \left( \sum_{j=k}^{\infty} \frac{|\xi_j|^p}{j} \right)^{\frac{1}{p}} \text{ where } \gamma_k \uparrow_k 1, \gamma_k \text{ is strictly increasing ,}$$

then he proved that when $\gamma_1 \geq \frac{2}{3}, (c_0, \|\cdot\|)$ has the fixed point property for affine $\|\cdot\|$-nonexpansive self-mappings. Then, recently we generalized his result and showed that if $\gamma_k \uparrow_k 1, \gamma_k$ is strictly increasing, $\gamma_1 \geq \frac{2}{3}$ and $\rho(\cdot)$ is an equivalent norm to the usual norm on $c_0$ such that

$$\limsup_n \rho\left(\frac{1}{n}\sum_{m=1}^{n} x_m + x\right) = \limsup_n \rho\left(\frac{1}{n}\sum_{m=1}^{n} x_m\right) + \rho(x)$$

for every weakly null sequence $(x_n)_n$ and for all $x \in c_0$ , then for every $\lambda > 0$, $c_0$ with the norm $\|\cdot\|_\rho = \rho(\cdot) + \lambda\|\cdot\|$ has the FPP for affine $\|\cdot\|_\rho$-nonexpansive self-mappings.

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● **NIGMATULLIN, Raoul R.*, NOUGMANOV, B. N.**, ***Kazan National Research Technical University named by A.V. Tupolev, RUSSIA, **Physical-Mathematical Lyceum, RUSSIA

*New Solutions of the Functional Equations and Their Possible Application in Treatment of Complex Systems*

In this paper we want to show some *original* solutions of the functional equations that can be considered as a main "bridge" connecting the fractional calculus and fractal geometry. This bridge should justify a wide application of the fractional calculus in many important applications and, from another side, increase the possibilities of the fractional geometry when the fractional calculus will serve as its basic tool. Initially, we justify this solution, and then show how it can be applied in the theory of the quasi-reproducible experiments. We consider the accurate solutions of the functional equation

$$F(x+LT) = \sum_{l=0}^{L-1} a_l(x) F(x+lT) + G(x) , \qquad (1)$$

where the function $G(x)$ is supposed to be *known*. The set of the functions $a_l(x)$ can be found *self-consistently* with the help of the functional least square method. The solution of this equation is tightly connected with another important functional equation

$$F(z\xi^L) = \sum_{l=0}^{L-1} a_l(\ln z) F(z\xi^l) + G(\ln z)\,, \qquad (2)$$

playing a key role in consideration of different self-similar processes in complex systems. As an example, we chose the measurements of the corresponding voltamperograms (VAGs) in electrochemistry. In the frame of new approach one can fit the VAGs with high accuracy and prove the wide applicability of equations (1) and (2) and their original solutions found. These solutions prompt a way for the generalization of the Grunvald-Letnikov formula for discrete case.

● **NISAR, Kottakkaran S.*, BALEANU, Dumitru**, PUROHIT, Sunil D.***, ***Prince Sattam bin Abdulaziz University, SAUDI ARABIA, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA, ***Rajasthan Technical University, INDIA

*On Certain Fractional Integrals Involving Generalized k-Bessel Function*

The present paper deals with the study of recently defined special function known as generalized *k*-Bessel function $\omega_{k,\nu}^{c,\gamma,\lambda}(z)$. Certain relations that exists between Saigo's fractional integral operators and the generalized *k*-Bessel function are investigated. The generality of newly established fractional integral formulas allow us to derive many intriguing special cases. Further, the results of this paper generalize, extend, and unify some known results.

● **NOOR, Muhammad A.*,**, NOOR, Khaldia I.**, BIN-ALMOHSIN, Bandar*, LATIF, Rafia**,** *King Saud University, SAUDI ARABIA, **COMSATS Institute of Information Technology, PAKISTAN

*Dynamical Systems Techniques for Variational Inequalities*

Dynamical systems arise naturally in numerous applied and theoretical fields including celestial mechanics, financial forecasting, environmental applications, neuroscience, brain modeling. It is known that the variational inequalities to the fixed point problems. This alternative equivalent formulation is used to consider some projected dynamical system associated with variational inequalities. These dynamical systems are used to suggest some new and efficient implicit proximal methods for solving variational inequalities and related optimization problems. The convergence analysis of the proposed new method is considered under some mild conditions. Our methods of analysis is very simple as compared with other techniques. Several special cases are discussed as applications of our main results. These results can be viewed as significant refinements of the previously known results.

● **NOOR, Muhammad A.*,**, NOOR, Khaldia I.**, BIN-ALMOHSIN, Bandar*,** *King Saud University, SAUDI ARABIA, **COMSATS Institute of Information Technology, PAKISTAN

*Auxiliary Principle Technique for Strongly Mixed Variational-like Inequalities*

We introduce and investigate a new class of variational-like inequalities, which is called strongly mixed variational-like inequality. It is shown that optimality conditions of a sum of differentiable preinvex function and nondifferntiable strongly preinvex function can be characterized by the strongly mixed variational-like inequalities. We use the auxiliary principle technique to discuss the existence solution and to suggest some iterative methods for solving these new inequalities. Convergence analysis of the proposed methods is also considered. Several special cases, which can be obtained from our results are discussed. Some open problems are suggested for future research.

● **OZKAN, Mustafa, OKE, Figen,** Trakya University, TURKEY

*Linear Codes over Non-Chain Ring*

It is seen that codes written over non-chain rings are better than codes known before in the last years. In this study cyclic codes over non-chain rings are studied. Relations between these codes and chain rings are identified.

● **OKEDOYE, Akindele M. ,** Federal University of Petroleum Resources, NIGERIA

*Heat Transfer in Hydro Magnetic Oscillatory Flow Past An Impulsively Started Porous Limiting Surface*

This paper report the analytical solution of two dimensional hydromagnetic oscillatory flow of a viscous, incompressible and electrically conducting fluid, past a porous, infinite limiting surface with variable suction. The fluid limiting surface is moved impulsively, with a constant velocity, either in the direction of the flow or in the opposite direction, in the presence of a transverse magnetic field. Solutions were obtained for velocity, induced magnetic and temperature fields and expression were obtained for skin friction, electric current density and rate of heat transfer at the limiting surface. Variations of the emerging flow condition were presented graphically and discussed.

● **OKSUZER YILIK, Ozlem*, KARSLI, Hasan**, TASDELEN, Fatma*, *** Ankara University, TURKEY, **Abant Izzet Baysal University, TURKEY

*Convergence of the Durrmeyer-type Operators in Variation Seminorm*

The aim of this paper is to establish variation detracting property and convergence in variation of the Bernstein-Durrmeyer modifications of the classical Bernstein operators in the space of functions of bounded variation. These problems are studied with respect to the variation seminorm. Moreover we also study the rate of convergence in terms of total variation.

● **OLGAR, Hayati*, SH. MUKHTAROV, Oktay*,**, AYDEMIR, Kadriye***,** *Gaziosmanpasa University, TURKEY, ******Azerbaijan National Academy of Sciences, AZERBAIJAN, *******Amasya University, TURKEY

*Some Properties of Weak Eigenfunctions for one Sturm-Liouville Problem*

Sturm-Liouville problems with eigenparameter dependent boundary conditions is one of the most extensively developing fields in pure and applied mathematics. First, we cite the works of Fulton [1] and Walter [4], both of which have extensively bibliographies, in the case of [2, 3], a discussion of physical applications. The main of goal of this study is to consider a class of Sturm-Liouville problems on two disjoint intervals for Sturm-Liouville equation together with supplementary interface conditions at the point of interaction. The spectral parameter, appears not only in the Sturm-Liouville equation but also in the boundary conditions. We suggest a special technique to reduce the considered problem into an integral equation by using of which we define a new concept. We introduce some self-adjoint compact operators in adequate Hilbert spaces such a way that the considered problem can be reduced to an operator-pencil equation. Finally, it is shown that the eigenfunctions for this class of problems form a Riesz basis of the corresponding Hilbert space.

● **SH. MUKHTAROV, Oktay*,**, OLGAR, Hayati*, AYDEMIR, Kadriye***, ***Gaziosmanpasa University, TURKEY, **Azerbaijan National Academy of Sciences, AZERBAIJAN, *******Amasya University, TURKEY

*Hilbert Space Formulation and Green Function of One Discontinuous Boundary Value Problem*

Boundary value problems with the spectral parameter appearing linearly in the boundary conditions have been studied in [1, 2, 3, 4, 5]. We deal with Sturm-Liouville type problems when the potential of the differential equation may have discontinuity at the one inner point and the eigen parameter appears not only in the differential equation but also in both boundary and transmissions conditions. By modifying some techniques we generalize some results of the classic regular Sturm-Liouville problems. In particular, we construct Green's function and derive asymptotic approximation formulas for Green's function and eigenvalues. Further we introduce a new operator-theoretic formulation in suitable Hilbert space such a way that the considered problem can be interpreted as the eigenvalue problem of this operator and construct the resolvent of this operator in terms of the Green's function.

● **ORHAN,Ozlem, OZER, Teoman,** Istanbul Technical University, TURKEY

*Application of Symmetry Approach of the Heat Transfer Equation*

We derive the time-independent integral for a nonlinear equation, namely fin equation, which is the extended surfaces used to increase the heat exchange from a hot or cold surface to surrounding areas. The heat transfer using fin of different shapes and profiles with variety of boundary conditions is described by different mathematical methods. Firstly, we deal with λ-symmetries, the knowledge of λ-symmetries enables us to obtain integrating factors, first integrals and the general solutions. Then, we analyze symmetry classification with respect to different choices of thermal conductivity and heat transfer coefficient functions of fin equation. Furthermore, the time independent integrals and analytical solutions for heat transfer equation are obtained by using the modified Prelle-Singer procedure as a different

approach. It is demonstrated that the equation is integrable with respect to its first integrals. Finally, the Lagrangian and Hamiltonian forms of the equation are investigated.

● **OSAWARU, Kelly E.* , AKEWE, H.** , OLALERU, J. O.** , ***University of Benin, NIGERIA, **University of Lagos, NIGERIA

*On Fuzzy Soft Mappings and Fixed Point Theorems*

In this paper, we contribute to the development of soft set and fuzzy set theories by introducing and studying the concept of fuzzy soft set and fuzzy soft mapping in the Heilpern sense and prove some fixed point results. Our results extend, generalize and improve several results in fuzzy set, fuzzy mapping, soft set and soft fuzzy set in literature.

● **OSTROVSKA, Sofiya,** Atilim University, TURKEY

*On the Lupaş q-Transform*

The *Lupaş q-transform* emerges in the study of the *limit q-Lupaş operator.* The latter comes out naturally as a limit for a sequence of the Lupaş *q*-analogues of the Bernstein operator.

**Definition.** Given $q \in (0,1)$, $f \in C[0,1]$, the *q-Lupaş transform* of *f* is defined by:

$$(\Lambda_q f)(z) := \frac{1}{(-z;q)_\infty} \cdot \sum_{k=0}^{\infty} \frac{f(1-q^k) q^{k(k-1)/2}}{(q;q)_k} z^k, \quad z \in \mathbb{C}.$$

This transform is closely related to the $q$-deformed Poisson probability distribution, which is used widely in the $q$-boson operator calculus, methods of summation for divergent series, approximation theory, and functional analysis. In this talk, some analytic and geometric properties of operator $\Lambda_q$ will be discussed.

● **OTELES, Ahmet,** Dicle University, TURKEY

*On the Inverse and the Powers of One Type of Skew Circulant Matrices*

Skew circulant and circulant matrices have a wide range of applications such as in graph theory, mechanics, mathematical chemistry, signal processing, coding theory and image processing, etc. They arise in applications involving the discrete Fourier transform and the study of cyclic codes for error correction. Numerical solutions of certain types of elliptic and parabolic partial di¤erential equations with periodic boundary conditions often involve linear systems associated with circulant matrices [1-3]. In this paper, we give the inverse and powers of one type of skew circulant matrices depending on the Chebyshev polynomials of the first and second kind.

● **OUHADER, Hanan, EL KYAL, Malika,** Ibn Zohr University, MOROCCO

*A Mixed-Integer Programming Model for Horizontal Logistics Collaboration in Distribution Chain*

Currently, Companies survive in increasingly competitive environment, characterized by increasing the level of customer requirements in logic of lean. This situation favors the emergence of new forms of governance supply chains with a more collective management of logistical problems in the context of a collaborative supply chain. In this type of supply chain, we can distinguish between two types of possible collaborations: vertical collaboration (between actors in the same supply chain) and horizontal collaboration (between companies in the same market , may be, competitors). Horizontal cooperation, if not new, at least somewhat addressed from a scientific point of view. We chose to consider as a relevant part of our research, horizontal cooperative phenomena. We are interested in this work to the case of horizontal cooperation among several companies that wish to pool the distribution of their products to main customers. We want to locate platforms in a two levels network (suppliers-platforms, platforms-customers) by minimizing the costs of upstream and downstream transportation. The objective of this paper is to provide an analytical model to a shared supply chain for goods distribution, so as to obtain a better overall logistics performance. The analysis of the literature shows that there is still a lack of conceptual tools to help companies design such network. This is a strategic decision consisting of designing a network by locating a number of logistical platforms and tactical and operational decision dealing with the customer allocation and vehicle routing. We attempt to model this problem mathematically as a two echelon location routing problem ( LRP-2E) for a more comprehensive resolution that separation decision levels. Our model is formulated by the MILP (Mixed integer linear programming) NP-hard type. The goal is to evaluate the benefits of the joint delivery of goods in terms of costs, CO2 emissions, and congestion in cities, by comparing two scenarios: collaboration and non-collaboration. In reality, partners are generally not interested in the profits generated by the entire alliance, but in the impact of the cooperation on their own P&L instead. We allocate the collaborative gain with the Shapley value method. The results obtained show that collaboration leads to a reduction in transport costs, distances travelled and CO2 emissions in addition to improving vehicle load rate. Indirectly it contributes to the minimization of congestion in cities.

● **OZTURK MIZRAK, Ozlem**, OZALP, Nuri**, ***Karabuk University, TURKEY**, ****Ankara University, TURKEY

*Fractional Fourier Transform Method Coupled with the CTIT Transformation*

We propose an adapted Fourier transform method that gives the solution of an oscillation equation with a fractional damping term in ordinary domain. After we mention a transformation of cosmic time to individual time (CTIT), we explain how it can reduce the problem from fractional form to ordinary form when it is used with Fourier transform, via an example for $1 < \alpha < 2$; where $\alpha$ is the order of fractional derivative. Then, we compile all results of this new solution approach.

● **BAS, Erdal, OZARSLAN, Ramazan,** Firat University, TURKEY

*The Diffusion Difference Equation*

Diffusion equation plays an important role in mathematical physics. It is related to describing the interactions between colliding particles and collisions of two spinless particles, it is assumed that the s-wave scattering matrix and the s-wave binding energies are precisely known as collision experiments. In this work, we consider the following Diffusion difference equation with Dirichlet boundary conditions,

$$-\Delta^2 x(n-1) + \big(q(n) + 2\lambda p(n)\big)x(n) - \lambda^2 x(n) = 0, n = 0,1,\dots\dots, b, \tag{1}$$

$$x(0) = x(b) = 0, \tag{2}$$

where $p(n) \in l^2[0,b], q(n) \in l^2[0,b]$, $b$ is a finite integer, $\Delta$ is the forward difference operator. Furthermore, $\lambda$ is the positive spectral parameter, $q(n) + 2\lambda p(n)$ is called potential function, $n$ is a finite integer. Some useful sum representation for the linearly independent solutions of the problem (1) - (2) has been acquired and by means of this result, asymptotic formula for eigenfunction is analyzed and these results are proved. In addition, we show some spectral properties for eigenvalues and eigenfunctions of the problem (1)-(2) ; Diffusion difference operator is self-adjoint, eigenvalues of this problem are simple and real, eigenfunctions, corresponding to distinct eigenvalues, of this problem are orthogonal. In this work, we use generally these references [1-5].

● **BAYRAM, Elgiz, AYGAR, Yelda, OZBEY, G. Gulcehre,** Ankara University, TURKEY

*The Resolvent of Discrete Sturm-Liouville Equation with Eigenparameter in Boundary Condition*

We consider a boundary value problem (BVP) consisting of a second-order difference equation and boundary condition depending on a spectral parameter

$$a_{n-1}y_{n-1} + b_n y_n + a_n y_{n+1} = \lambda y_n, \qquad n \in \mathbb{N}$$

$$(\gamma_0 + \gamma_1\lambda)y_1 + (\beta_0 + \beta_1\lambda)y_0 = 0.$$

In this study, we investigate the green function and the resolvent of this BVP under the condition

$$\sum_{n=1}^{\infty}(|1 - a_n| + |b_n|) < \infty.$$

Then discussing the resolvent, we give some properties of eigenvalues and resolvent of this BVP.

● **OZDEMIR, Gokcen, KARABOGA, Nurhan,** Erciyes University, TURKEY

*Design of M-Channel Uniform Cosine Modulated Filter Bank Using qABC Algorithm*

Heuristics is a pure discovery method frequently used in mathematics. Heuristic algorithms are widely used in solving many different types of problems in different engineering branches. Heuristic algorithms are more preferred in problems where the solution time is as important as finding the optimum solution. In this study, a uniform Cosine Modulated Filter Bank (CMFB) is designed using a variant heuristic named quick Artificial Bee Colony (qABC) Algorithm. Firstly, both the CMFB and qABC Algorithm structures are introduced. Than proposed CMFB design using qABC Algorithm is explained. A design example is given in terms of intelligibility, and the values of the performance parameters of example are presented on a detailed table and the performance of the proposed design is examined.

● **OZGEN, H. Nedret,** Mersin University, TURKEY

*On Two Integrability Methods of Improper Integrals*

In this work, we have introduced the concept of $|\overline{N}, p|_k$ integrability of improper integrals and by using this definition a known theorem of Bor [H. Bor, On two summability methods, Math. Proc. Cambridge Philos. Soc., 97 (1985) 147-149] has been proved for the integrability methods.

● **OZKAN, Mustafa, OKE, Figen,** Trakya University, TURKEY

*Construction of Hadamard Codes with Rings*

In this study, Hadamard codes defined over the fields are consturucted over finite chain rings and relations between these codes and binary fields are obtained. Using some special matrices; codes are defined via elements of the ring. Then using the relations between these codes and linear codes, Hadamard codes are classified.

● **OZMEN, Ayse, WEBER, Gerhard-Wilhelm,** Middle East Technical University, TURKEY

*A Review of R(C)MARS and (C)MARS with a Comparison Study*

*Multivariate Adaptive Regression Spline* (*MARS*) has been used successfully many areas of technology, science and economy recently. MARS obtains flexible high-dimensional nonparametric regression models, and it represents a great promise for fitting nonlinear multivariate functions. *Conic MARS* (*CMARS*) is an alternative method to a well-known regression tool MARS. In CMARS method, a *Penalized Residual Sum of Squares* (*PRSS*) is applied for MARS as a *Tikhonov Regularization* (*TR*) problem, and this two-objective optimization problem is studied as a *Conic Quadratic Programming* (*CQP*). However, data are supposed to contain fixed variables for MARS and CMARS. Indeed, data have noise in both output and input variables. Consequently, optimization problem's solutions may show a remarkable sensitivity to perturbations in the parameters of the problem. So, we analyze how uncertainty incorporated into the (C)MARS model, and we introduce a robustification of (C)MARS with robust optimization under polyhedral uncertainty. We call it as *R*(*C*)*MARS*. By using robustification in (C)MARS, we try to decrease the **estimation variance**. Because

of the computational effort which our robustification of (C)MARS easily needs, we also present the concept of a weak robustification. We compare the performance of the RCMARS model with the performance of MARS and CMARS on rainfall data. The results state that RCMARS can build more accurate and stable model compared to the results of MARS and CMARS.

● **OZTAS, Zuleyha,** Anadolu University, TURKEY

*Spin Orbit Coupled BEC in a Random Potential*

In this study we examine Bose Einstein condensate including spin orbit coupling effects in a random potential. We consider a weakly interacting two component Bose Einstein condensate. The problem is to solve coupled Gross Pitaevskii equation using pseudospectral Fouirier and split step Fourier methods. We choose a random speckle potential acting along the z direction. We obtain both solutions of Gross Pitaevskii equation numerically. The effects of interactions and the strength of the random speckle potential on the phase separation is investigated. We also study spin orbit coupling effects on the solutions.

● **OZTURK, Guner, AKTAS, Rabia, TASDELEN, Fatma,** Ankara University, TURKEY

*Miscellaneous Properties of a Family of Orthogonal Polynomials in Two Variables*

The aim of this paper is to present miscellaneouus properties of a family of two-variable orthogonal polynomials. We obtain some recurrence relations and generating functions for these polynomials. Moreover, we derive several families of bilateral and bilinear generating functions. We also discuss some special cases of the results obtained.in the paper.

● **OZTURK, Mahpeyker,** Sakarya University, TURKEY

*Some Recent Results on Fixed Point Theorems*

In the present paper, by introducing some new concepts we give some fixed point results and show that the presented results are improvements of some known ones in the literature.

● **PANDIR, Yusuf*, GUREFE, Yusuf**,** *Bozok University, TURKEY, **Usak University, TURKEY

*New Type of F-Expansion Method and Its Application*

In this study, a new type F-expansion method which is able to find Jakobi elliptic function solution is offered. Single and combined multiple Jacobi elliptic functions are presented in the solution function with this suggested method. We have obtained analytical solutions of the complex coupled Higgs field equation which introduces quantum field to illustrate the generation mechanism of mass for gauge bosons by using the new type of F-expansion method. The new method yields a more systematic, simplicity use of the solution process of nonlinear equations.

● **PASAOGLU, Bilender*, UGURLU, Ekin**, ***Suleyman Demirel University, TURKEY, **Cankaya University, TURKEY

*Scattering Theory and Spectral Analysis of the Direct Sum Sturm-Liouville Operators*

In this talk, a space of boundary values is constructed for direct sum minimal symmetric Sturm-Liouville operators and description of all maximal dissipative, maximal accumulative, selfadjoint and other extensions of such a symmetric operator is given in terms of boundary conditions. It is constructed a selfadjoint dilation of dissipative operator and its incoming and outgoing spectral representations, which makes it posibble to determine the scattering matrix of the dilation. Moreover it is established a functional model of the dissipative operator and define its characteristic function. Finally, we give a theorem on completeness of the system of eigenfunctions and associated functions of the dissipative operators.

● **PASAOGLU, Bilender,** Suleyman Demirel University, TURKEY

*Spectral Problems of Singular Hamiltonian System with an Eigenparameter in the Boundary Condition*

In this talk, we study a non-self-adjoint eigenparameter dependent singular differential 1D Hamiltonian system with the singular end points a and b in the Hilbert space, and we consider that this 1D Hamiltonian system is in the limit-circle cases at a and b. For this purpose we use the maximal dissipative operator associated with the considered problem whose spectral analysis is sufficient for boundary value problem. Self-adjoint dilation theory of Sz.-Nagy-Foiaş developed for the dissipative operators is used. Moreover we construct incoming and outgoing spectral representations of the self-adjoint dilation. This representations allows us to determine the scattering matrix. Therefore a functional model of the dissipative operator is constructed. Moreover, a functional model of the dissipative operator is constructed and its characteristic function in terms of solutions of the corresponding Hamiltonian system is described. Therefore using the obtained results for the characteristic function theory, theorems on completeness of the system of eigenvectors and associated vectors of the dissipative operator and Hamiltonian boundary value problem have been proved.

● **PASAOGLU, Bilender,** Suleyman Demirel University, TURKEY

*Dissipative Singular Matrix Sturm-Liouville Operators with General Boundary Conditions*

In this work, a space of boundary values of the minimal symmetric singular matrix Sturm-Liouville operator acting in the Hilbert space with maximal deficiency indices (2m,2m) (in limit-circle case at singular end point b) is constructed. All maximal dissipative, maximal accumulative, self-adjoint, and other extensions of such a symmetric operator are given in terms of boundary conditions at a and b. Maximal dissipative operators with general (coupled or separated) boundary conditions is investigated. A self-adjoint dilation is constructed for dissipative operator and its incoming and outgoing spectral representations, which make it possible to determine the scattering matrix of the dilation. We also construct a functional model of the dissipative operator and determine its characteristic function in terms of the scattering matrix of the dilation. Moreover a theorem on completeness of the system of eigenvectors and associated vectors (or root vectors) of the dissipative operators proved.

● **PINTO, Carla M. A.*, CARVALHO, Ana R. M.**,** *School of Engineering, Polytechnic of Porto, PORTUGAL, ******University of Porto, PORTUGAL

*The Burden of the HIV Viral Load on the Natural Progression of HCV in a Coinfection Model*

We construct a fractional order model for the coinfection of HIV and HCV, where treatment for HCV is considered. We modify previous models for HCV monoinfection to include the dynamics of the coinfection. We compute the basic reproduction number and the stability of the disease-free state. We find that the HIV viral load has a significant impact on the severity of the HCV infection. This is observed for all values of the order of the fractional derivative. Moreover the treatment efficacy is also a relevant parameter on the natural progression of HCV on the coinfection.

● **PINTO, Carla M. A.*, CARVALHO, Ana R. M.**,** *School of Engineering, Polytechnic of Porto, PORTUGAL, ******University of Porto, PORTUGAL

*Fractional Dynamics of a HIV Infection Model with Time-varying Drug Exposure*

We introduce a fractional order model for HIV dynamics where time-varying drug-exposure and drug-resistance are assumed. We derive conditions for the local asymptotic stability of the disease-free equilibrium. We find periodic stable endemic states for certain parameter values and when considering a density dependent decay rate for the T cells. The order of the fractional derivative plays an important role in the severity of the epidemics.

● **POLAT, Yasemin, TASAN, A. Serdar,** Dokuz Eylul University, TURKEY

*Identification of Customer Preference for Olive Oil by Using Discrete Choice Methods*

The olive oil is an important traditional agro-food product, specifically in Turkey. Also olive oil is at the base of the Mediterranean diet since the past. For this reason, the olive oil market is growing day by day. Customer preference is taking a crucial role for company's production decisions and marketing strategies. Because human behavior is complex and difficult to understand the underlying choice mechanism and reasoning. Identifying the human behavior, discrete choice models are commonly used. The aim of this study is develop consumer choice model for olive oil by using the real data gained by survey. In this choice phase, we considered criteria such as price, brand, acidity, packaging type to decide on the alternative olive oil having maximum utility.

● **SECILMIS, Deniz, PURUTCUOGLU, Vilda,** Middle East Technical University, TURKEY

*Modelling of Biochemical Networks via Classification and Regression Tree Methods*

In the description of biological networks, a number of modeling approaches has been suggested based on different assumptions. The major problems in these models and their associated inference approaches are the complexity of biological systems, resulting in high number of model parameters, few observations from each variable in the system, their sparse structures and high correlation between model parameters. From recent studies, it has been seen that the nonparametric methods can ameliorate these challenges and be one of the strong alternative approaches. Furthermore, it has been observed that not only the regression type of

nonparametric models, but also nonparametric clustering methods whose calculations are adapted to the biochemical systems can be another promising choice. Hereby, in this study, we propose the classification and regression tree (CART) method as a new approach in the construction of the complex systems when the system's activity is described under its steady-state condition. Basically, CART is a classification technique for highly correlated data and can be represented as the non-parametric version of the generalized additive model. In this work, we use CART in the construction of biological modules and then networks. We analyze the performance of CART comprehensively under various Monte Carlo scenarios such as different data distributions and dimensions. We compare ours results with the outputs of the Gaussian graphical model (GGM) which is the most well-known model under the given condition of the system. In our study, we also evaluate the performance of CART with GGM findings by using real systems. For this purpose, we choose the pathways which have a crucial role on the cervical cancer. In the analyses, we consider this particular illness as it is the most second common cancer type in women both in Turkey and in the word after the breast cancer and there is only a limited information for the description of this complex system disease.
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● **RABAB, Belalmi**, **Z. , Aouachria, N. , Leridi,** University of Batna1, ALGERIA

*Thermal Analyse of Solar Chimney*

We present in this study a mathematical modeling that has been developed to estimate the power output of a solar chimney and to study the impact of the weather conditions and the dimensions of this chimney on the power generated. The comparison of the results of the mathematical model with the experimental data shows a good agreement. The results show that the turbine pressure drop factor, the diameter and the optical properties of the collector are important parameters for the design of solar chimneys.

● **RAKHIMOV, Abdumalik,** International Islamic University, MALAYSIA

*Localization of the Spectral Expansions Associated with the Partial Differential Operators*

In this paper we prove precise conditions of the summability and eqiu-summability of the spectral expansions associated with partial differential operators. It is established sharp relations between index of summation and singularity of the distribution.

● **RASUL, Rabar M. , INAN, Ibrahim E. , BULUT, Hasan,** Firat University, TURKEY

*Tan* $\left(F(\xi)/2\right)$*-Expansion Method for Exact Solutions of the (2+1)-Dimensional Potential KdV Equation*

In this paper, we consider the $tan\left(\frac{F(\xi)}{2}\right)$-expansion methodfor investigating the traveling wave solutions of the (2+1)-dimensional potential KdV equation. We find some traveling wave solutions such as trigonometric, hyperbolic and rational function solutions. Then, we also plot the two- and three-dimensional graphics for some traveling wave solutions obtained in this study by using the Wolfram Mathematica 9.

● **RAZVARZ, Sina, JARILLO, Cristóbal V. ,** Centro de Investigación y de Estudios Avanzados del IPN, MEXICO

*The Effect of Baffles on Heat Transfer Enhancement*

The enhancement of heat transfer by geometric changes of objects shapes is used from technicians and engineers for a long time. The discovery and use of nanofluids and their unique properties leads to a new revolution on the heat transfer. This paper presents simulation of fluent software applied for the flow tube with a constant flux, and study the effect of baffles, and use of nanotechnology on heat transfer and we simulate it in fluent with baffle.

● **REHOUMA, Abdelhamid,** University of Hama Lakhdar of Eloued, ALGERIA

*Polar Orthogonal Polynomials And Applications*

We construct a new class of polynomials the so called Polar polynomials, this set of polynomials associated to orthogonal polynomials on the unit circle. We ask the asymptotic behavior of polar polynomials on the unit circle.

● **REZAPOUR, Shahram,** Azarbaijan Shahid Madani University, IRAN

*On a System of Fractional Finite Difference Inclusions*

As you know, some natural phenomena be described by singular fractional differential equation while we have not appropriate methods for solving this type models. In this talk, we try to introduce numerical methods (via a nonlinear analytical technique) for solving some fractional singular integro-differential equations.

● **BALEANU, D.*, SABERPOUR, Z.**, REZAPOUR, Shahram**, ***Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA, **Azarbaijan Shahid Madani University, IRAN

*On Dimension of the Set of Solutions for a Fractional Differential Inclusion*

First, we show that dimension of the set of solutions for an inclusion problem including the Caputo-Fabrizio derivative is infinite dimensional under some conditions. Also, we study the existence of solution for another fractional integro-differential inclusion including the Caputo-Fabrizio derivative. Finally, we show that a hybrid inclusion problem is infinite dimensional has solution under some conditions.

● **SAADI, Abdelkader,** University of Bechar, ALGERIA

*Stability of Fractional-Order Systems with Riemann-Liouville Derivative*

This paper deals with stability of a certain class of fractional order systems with the Riemann-Liouville derivative. Some sufficient conditions on the stability and asymptotic stability of autonomous and non-autonomous fractional differential systems are given. The results are obtained via the properties of Mittag-Leffler functions and the non-standard Gronwall inequality.

● **SAHIN, Hakan*,**, ALTUN, Ishak***, TURKOGLU, Duran***, *Gazi University, TURKEY, **Amasya University, TURKEY, ***Kirikkale University, TURKEY

*A New Generalization of M- Metric Space and Feng-Liu Type Fixed Point Theorems for Multivalued Mappings*

Nadler showed that if (X,d) is a complete metric space and T is a multivalued contraction mapping, then T has a fixed point in X [1]. In a different way, Feng and Liu generalized the Nadler's result without using Pompeiu-Hausdorff metric and by using C(X) valued the mapping T (in here C(X) is all nonempty closed subsets of X)[2]. On the other hand, Matthews introduced the partial metric space as a generalization of ordinary metric space[3]. After that, to extend of partial metric space, Asadi et al. [4] introduced the concept of M-metric space and then obtained some fixed point theorems for single valued mappings on M-metric space. Besides, there is a different generalization of ordinary metric space in the literature known as b-metric space[5]. After that, we proposed new definition and showed that our definition generalized both M-metric and b-metric on a nonempty set X. Besides, we discussed the topological structure generated by this new metric space and then taking into account the family of all nonempty closed subsets with respect to this topology, we obtained Feng-Liu type some fixed point theorems for multivalued mappings of on this new metric space. Then, some illustrative examples are also provided.

● **SAKAR, Mehmet G.*, AKGUL, Ali**, SALDIR, Onur*,** *Yuzuncu Yıl University, TURKEY, **Siirt University, TURKEY

*A New Technique for Numerical Solution of Fractional BVP's*

In this research, a new numerical approach is suggested for solving fractional nonlinear boundary value problems. Fractional derivative are descripted in Caputo sense. This approach is based on reproducing kernel Hilbert space theory with Legendre polynomials. The analysis used in this study forms a crucial step in the process of development of fractional calculus. Results are given as graphically and in tabulated forms to prove the power of the method.

● **SAKAR, Mehmet G.*, AKGUL, Ali**, SALDIR, Onur*,** *Yuzuncu Yıl University, TURKEY, **Siirt University, TURKEY

*Numerical Solution of Fractional Bratu Type Equation by Legendre-Reproducing Kernel Method*

In this study, we present an iterative reproducing kernel method for numerical solution of fractional Bratu type equation.. We obtain an approximate solution by given iterative method. Convergence analysis is constituted theoretically. Numerical experiments show that approximate solution uniformly converges to exact solution. Additionally derivatives of approximate solution are also uniformly convergent to the derivatives of exact solution. The results indicate that the proposed method very efficient for fractional Bratu type equation.

● **SALDIR, Onur, SAKAR, Mehmet G. ,** Yuzuncu Yıl University, TURKEY

*An Iterative Reproducing Kernel Method for Time and Space Fractional Burgers Equation*

In this research, we present an iterative reproducing kernel method for solving one dimensional variable coefficient fractional Burgers equation with initial condition. We obtain an approximate solution by given iterative method. Convergence analysis is constituted theoretically. Numerical experiments show that approximate solution uniformly converges to exact solution. Additionally, derivatives of approximate solution are also uniformly convergent to the derivatives of exact solution. The results indicate that the proposed method very efficient for fractional Burgers equation.

● **SALEEM, Naeem,** University of Management and Technology, PAKISTAN

*Best Proximity Point Results in Fuzzy Metric Spaces*

In this talk, sufficient conditions for existence and uniqueness of the best proximity points for a new class of non-self mappings in non-Archimedean fuzzy metric space are discussed . We also mention some interesting aspects of best proximity point theory in the setup of fuzzy metric spaces. This talk could be viewed as a discussion on extension of recent development on proximal contraction mappings in such spaces.

● **SARIAYDIN, Remziye, BAS, Erdal,** Firat University, TURKEY

*On Solutions of Fractional Sturm Liouville Problem*

In this work, fractional Sturm-Liouville problem is taken into consideration and a new algorithm to solve the inverse Sturm-Liouville problem is introduced by Mizutani method [1]. According to this method, inverse problem is defined by means of eigenvalues and normalized numbers. Numerical applications of a theoretical conjecture are presented. Our results are shown with a few numerical examples and figures. We use these references generally, [2- 6].

● **SARIAYDIN FILIBELIOGLU, Ayse*,**, KARASOZEN, Bulent**,** *Yuzuncu Yil University, TURKEY, **Middle East Technical University, TURKEY

*Discontinuous Galerkin Finite Elements Method for Allen-Cahn&Cahn-Hilliard Equations with Degenerate Mobility*

Allen–Cahn (AC) and Cahn–Hilliard (CH) equations are the most known models for gradient flow equations characterized by energy decreasing property. Recently, they have been widely used to model many problems in nature including biology, image processing, fluid flows, and material science. In this contribution, we consider AC and CH equations with degenerate mobility function in [4, 5] to describe phase separation and inter-facial dynamics in material science. In order to capture the physical properties of both models discontinuous Galerkin finite elements method (DGFEM)[1, 3] is combined with average vector field (AVF) method. While DGFEM approximation allows to capture the sharp gradients and unphysical oscillations that affect the numerical solution locally, AVF method [2] preserves the energy of system. We also prove unconditionally energy stability of the fully discrete scheme for both model and demonstrate with some numerical results.

● **KIM, Daeyeoul*, SARP, Umit**, IKIKARDES, Sebahattin**,** *National Institute for Mathematical Sciences, SOUTH KOREA, **Balikesir University, TURKEY

*A Study of Properties of the Absolute Möbius Divisor Function and Their for Leaf Veins*

In this study, we introduce the absolute Möbius divisor function, orders notion, n-gonal number, convexity and area. According to some numerical computational evidence, we investigate and prove certain identities on the absolute Möbius divisor function. Subsequently, the relationship between the absolute Möbius divisor function with some special numbers (such as Fermat primes) and sequences has been researched and some results have been obtained. Leaves are very important component of variety of plants. There are several modelings of leaf veins. Finally, we introduce a new pattern of leaf veins for virtual leaf using our result.

● **SAYIN, Isiltan*, ARIKAN, Feza*, ARIKAN, Orhan**, ***Hacettepe University, TURKEY, **Bilkent University, TURKEY

*Generalization of Fresnel Integral Computation by Fractional Fourier Transform for Electromagnetic Vector Fields*

Radiated fields from an electromagnetic source distribution can be obtained by solving the Maxwell's Equations. The radiation integral in the solution process is generally hard to solve analytically and it requires intensive computational load for direct numerical methods. Therefore, mathematical approximations are employed to get simple integral forms that are convenient for fast numerical methods. Fresnel approximation, providing a simple mathematical form for the radiation integrals, has been used in many areas such as optics, near-field antenna analysis, Computer-Generated-Holography. Fractional Fourier Transform (FrFT) is the generalization of the ordinary Fourier Transform (FT) and forms a subclass of the Linear Canonical Transform. FrFT is used in many fields, such as signal processing, optics, telecommunications, noise filtering, beamforming, and solution of differential equations. The FrFT kernel has a quadratic phase. In recent decades, fast and efficient numerical algorithms are developed to compute FrFT, whose computational complexity are in the order of the fast FT. In diffraction theory, starting from the radiation integrals, the field at the observation point is given by the Rayleigh-Sommerfeld integral which is hard to evaluate numerically. When Fresnel approximation is applied to the free-space scalar Green's function in the phasor domain, quadratic-phase kernel of the Fresnel radiation integral is obtained. The Fresnel integral is the paraxial approximation to the Rayleigh-Sommerfeld integral. Since Fresnel integral and FrFT have quadratic phase kernels, Fresnel integral can be written in terms of the continuous FrFT of the source distribution. So, efficient and accurate computation methods of FrFT can be applied to solve the Fresnel integrals. In the literature, there are studies which investigate the computation of scalar fields by employing FrFT. However, these studied are limited only to scalar fields. In electromagnetics, radiation integrals have to be solved in order to obtain the fields radiated from a current source. In this study, electric field vector components radiated from a current source are expressed in terms of FrFT. By adapting the numerical FrFT methods to electromagnetic radiation integrals, fast and efficient computation of the Fresnel and Fraunhofer field components can be achieved. Scalar solution of Fresnel integral by FrFT method is generalized to electromagnetic vector fields. The developed method can easily be applied to current distributions of wire and aperture antennas. The developed method is as accurate as analytical solutions and it is computationally efficient when compared to numerical solution techniques.

● **SCARDAMAGLIA, Bruno,** Universit della Calabria, ITALY

*On Modified Mann's Method to Approximate Strongly Fixed Points of Strict Pseudo-Contractive Mappings*

Inspired by Hussain, Marino et al. (*On some Mann's type iterative algorithms*, FPTA (2015) 2015:17), we study a modified Mann's method to approximate strongly fixed points of strict pseudo-contractive mappings. In the article cited above, is shown that the same algorithm converges strongly to a fixed point of a nonexpansive mapping under suitable hypotheses on the coefficients. Here the assumptions on the coefficients are different, as well as the techniques of the proof.

● **SAKA, Bulent, SEBER, Yusuf, DAG, Idris,** Eskisehir Osmangazi University, TURKEY

*A Quintic Trigonometric B-spline Collocation Method for Solving the Kuramoto-Sivashinsky Equation*

Many of the problem encountered in the area of science are modelled with the partial differential equations. Since the model problems, especially nonlineer problems, cannot be solved analytically, the numerical methods are used to reveal the model. Thus numerical methods have been developed to solve the differential equations under the initial and boundary conditions. In this paper, the quintic trigonometric B-spline collocation method will be set up to find the numerical solution of the Kuramoto-Sivashinsky (K-S) equation. The equation has the following form

$$U_t + UU_x + \varepsilon U_{xx} + \nu U_{xxxx} = 0 \tag{1}$$

where $\varepsilon$ and $\nu$ are arbitrary constants which corresponding the growth of linear stability and surface tension, respectively. K-S equation includes terms of nonlinear advection $UU_x$, linear growth $U_{xx}$ and high order dissipation $U_{xxxx}$. When $\nu$ is zero, the equation gets reduced to Burgers' equation. It is used as model equation in a number of applications including concentration waves and plasma physics, flame propagation and reaction-diffusion combustion dynamics, free surface film-flows and two face flows in cylindrical or plain geometries [1-3]. When the B-spline functions are used for the finite element methods to solve differential equations, economical and easy computer codes can be developed. The trigonometric B-spline functions are alternative to the polynomial B-spline functions. The trigonometric B-splines have been used to fit curve and to approximate the surfaces. But few studies in which the differential equations have solved with the collocation method incorporated the trigonometric B-splines exist. We will search the numerical methods that deal with numerical solutions of the differential equations using quintic trigonometric B-splines. Trigonometric B-spline collocation method will be designed to solve the equation mentioned above, computer code will be written in matlab packet program. Comparison of the results will be made with ones existing in the literature. The K-S equation is split into the coupled matrix system by letting $V = U_{xx}$. Efficiency of space splitting technique together with quintic trigonometric B-splines are sought. K-S equation is space-splitted as

$$\begin{aligned} U_t + UU_x + \varepsilon V + \nu V_{xx} &= 0, \\ V - U_{xx} &= 0. \end{aligned} \tag{2}$$

This system includes the second-order derivatives so that smooth approximation can have constructed with the combination of quintic trigonometric B-splines.

● **SEL, Cagri*, BILGEN, Bilge**, ***Karabuk University, TURKEY, **Dokuz Eylul University, TURKEY

*A Hybrid Mixed Integer Linear Programming and Constraint Programming Model for the Planning and Scheduling Problem in the Dairy Industry*

This paper considers an integrated planning and scheduling of set type yoghurt production in the dairy industry. A mixed integer linear programming formulation is introduced to integrate tactical and operational decisions efficiently. Further, an iterative hybrid solution approach is proposed combining complementary strengths of mixed integer linear programming and constraint programming methodologies. The hybrid approach improves computational efficiency to account for the different decision levels in an iterative manner by solving big bucket planning and small bucket scheduling problems.

● **ALGIN, Abdullah, SENAY, Mustafa,** Eskisehir Osmangazi University, TURKEY

*High-Temperature Thermostatistical Properties of the VPJC-Type q-Fermion Gas Model in Two Dimensions*

We study the high-temperature thermostatistical properties of the VPJC-type q-fermion gas model in two-dimensional space. We derive many of the thermodynamical and statistical functions of this deformed fermion model for high temperatures, and the effects of deformation parameter q in the interval $0 < q < 1$ are discussed. We also discuss possible physical applications of this deformed fermion gas model.
Acknowledgements: This study is supported by the Scientific and Technological Research Council of Turkey (TUBITAK) under the Project No: 113F226.

● **BAYKASOGLU, Adil, SENOL, Mumin E. , DUDAKLI, Nurhan,** Dokuz Eylul University, TURKEY

*Solving Resource Constrained Project Scheduling Problems via Constraint Programming*

Resource constrained project scheduling problem (RCPSP) that contains resource and precedence constraints simultaneously is one of the hardest combinatorial optimization problems. Although there are many studies concerning RCPSP in the literature, there are very few approaches that provide efficient results in reasonable time. On the other hand, constrained programming (CP) is one of the most convenient tools for modeling and solving scheduling problems through its ability to handle tricky constraints. Based on this motivation, in this study a CP model is developed for solving RCPSP. The proposed model is tested on different size benchmark problems. The preliminary results are showed that the proposed model is very effective for solving RCPSP in terms of solution quality and solution time.

● **BAYKASOGLU, Adil, SENOL, Mumin E. ,** Dokuz Eylul University, TURKEY

*Multi Agent-Based Stochastic Diffusion Search Algorithm for Solving Single Machine Total Weighted Tardiness Problem*

In recent years, most of the real life systems tend to be more intelligent and people are looking for effective and practical approaches for designing intelligent systems. In this endeavor, multi-agent based methods are becoming serious alternatives than other approaches for modeling complex intelligent systems and related problems. Based on this motivation, in this study, a metaheuristic algorithm which is known as Stochastic Diffusion Search (SDS) is realized in a multi-agent based environment for solving the Single Machine Total Weighted Tardiness (SMTWT) problem. The problem is very common in industrial settings and it is known as a NP-hard combinatorial optimization problem. The preliminary results obtained from our dynamic multi-agent algorithm show that the proposed approach is capable of producing good solutions.

● **SEZEN, Umut*, ARIKAN, Orhan**, ARIKAN, Feza*, ***Hacettepe University, TURKEY, **Bilkent University, TURKEY

*HF Signal Propagation in Ionosphere Using Calculus of Variations*

Ionosondes are special type of radars that are utilized for reconstruction of electron density profiles in Near Vertical Incidence Sounding (NVIS) mode. The variability of ionosphere is represented in electron density distribution in height. In the literature, the Calculus of Variations has been utilized in solving light propagation over Frenet-Serret Curvature path through Snell's Law as the light ray traverses media with different refractive indices. In this study, the electron density profiles obtained from ionosondes are used in construction of refractive indices in near vertical direction and signal propagation ray path in High Frequency (HF) band is obtained using calculus of variations in near vertical incidence for the first time. The main advantage of the proposed solution is the reduced computational complexity and time.

● **SEZGEK, Seyda, DAGADUR, Ilhan,** Mersin University, TURKEY

*Double Wedge and Weakly Double Wedge FDK-Spaces*

A subspace $\mathrm{E}$ of the vector space $\Omega$ is called a DK-space, if all of the seminorms $r_{kl}: E \to \boldsymbol{R}$, $x = (x_{ij}) \mapsto |x_{kl}|$ $(k, l \in \boldsymbol{N})$ are continuous. A DK-space with a Frechet topology is called FDK-space. In our study, we introduce definitions of strongly conull (conull) and (weakly) double wedge space for an FDK-space. And some important inclusion results are obtained. Also, we examine the relation between conull and double wedge FDK-spaces.

● **SH. MUKHTAROV, Oktay*,**, AYDEMIR, Kadriye***, OLGAR, Hayati*, ***Gaziosmanpasa University, TURKEY, **Azerbaijan National Academy of Sciences, AZERBAIJAN, *******Amasya University, TURKEY

*The Eigenvalue Problem with Interaction Conditions at One Interior Singular Point*

Some physical processes, both classical physics and quantum physics reduced to eigenvalue problems for Sturm-Liouville equations. In the recent years there has been an increasing

interest in discontinuous eigenvalue problems for various Sturm-Liouville type equations. Such problems are connected with heat transfer problems, vibrating string problems, diffraction problems and etc. In this study we shall investigate a class of two order eigenvalue problem with supplementary transmission conditions at one interior singular point. We give an operator-theoretic interpretation in suitable Hilbert space.

● **CASTRO, L. P.*, SIMOES, Alberto M.**, ***University of Aveiro, PORTUGAL, **University of Beira Interior, PORTUGAL

*Hyers-Ulam and Hyers-Ulam-Rassias Stability for a Class of Integro-Differential Equations*

We analyse different kinds of stability for a class of integro-differential equations within appropriate metric spaces. Sufficient conditions are obtained in view to guarantee Hyers-Ulam stability and Hyers-Ulam-Rassias stability for such a class of integro-differential equations. We will be considering the different situations of having the integrals defined on finite and infinite intervals. Among the used techniques, we have fixed point arguments and generalizations of the Bielecki metric. Concrete examples will be also described in view to illustrate the obtained results.

● **BAYRAM, Elgiz, AYGAR, Yelda, SOLMAZ, Seyda,** Ankara University, TURKEY

*Discrete Dirac System with a Point Interaction*

In this work, we investigate Jost solutions and Jost function of discrete Dirac system with a single point interaction. We also study properties of the scattering operator of this system.

● **SOUMEYA, Hacene C. , MOHAMED, Dalah,** Freres Mentouri Constantine University, ALGERIA

*Formulation Variational for Electro-Elastic Problem with Friction*

In this work, we present a mathematical model that describes the antiplane shear deformation in frictional contact with a rigid foundation. First, we suppose that the material is assumed to be electro-elastic. In the second step, we try to derive a variational formulation of the model. In the third step, we prove the existence of a unique weak solution to the model.

● **SUBULAN, Kemal, BAYKASOGLU, Adil,** Dokuz Eylul University, TURKEY

*A New Intermodal Fleet Planning Model via Hybrid Fuzzy-Stochastic Mathematical Programming Method*

This paper presents a hybrid fuzzy & stochastic mathematical programming model for a real-life intermodal fleet planning problem of an international logistics company in Turkey. The proposed model incorporates several complex fleet management decisions simultaneously such as fleet sizing/composition, fleet allocation, transportation mode selection, freight planning, empty vehicle repositioning, fleet expansion/reduction etc. Since the real-life fleet management systems may involve different uncertainty categories concurrently, i.e., randomness and fuzziness, a hybrid chance-constrained stochastic programming and fuzzy resolution method is utilized in order to generate various solutions under different confidence and uncertainty levels. In addition to minimize overall transportation cost and environmental

impact objectives, maximization of the customer satisfaction is also targeted. For handling these conflicting objectives jointly and producing compromise solutions to the decision makers, a weighted additive fuzzy goal programming approach is applied. Finally, a real-life case study is presented to show validity, practically and applicability of the proposed model.

- **SUBULAN, Kemal,** Dokuz Eylul University, TURKEY

*A Novel Constrained Fuzzy Arithmetic Based Approach for Designing a Reverse Supply Chain Network with Fuzzy Decision Variables*

In recent years, there has been an increasing attention to model and solve fuzzy mathematical programming models including fuzzy decision variables. However, most of the available methods for solving fuzzy linear programming problems were developed based on standard fuzzy arithmetic or extension principle. In some situations, these methods may cause unrealizable and impractical solutions due to not taking into account the available information while performing fuzzy arithmetic operations. Based on this motivation, this paper presents a novel approach based on constrained fuzzy arithmetic concept for solving fully fuzzy linear programming problems with fuzzy variables. The proposed method is also able to consider decision maker's attitude toward risk. For verification and validation of the proposed approach, a fully fuzzy reverse supply chain network design problem is handled. The results of the proposed approach are also compared to the available standard fuzzy arithmetic based methods in the literature. The computational results have shown that information efficient and more reliable solutions can be produced to risk-averse decision makers by making use of the proposed approach.

- **SUNAOGLU, Deniz P. , GUNER, Erdal,** Ankara University, TURKEY

*On Fuzzy Normed Spaces Category*

The aim of this study is to give some information about fuzzy normed spaces,then try to find transitions from this fuzzy normed spaces category to another categories.

- **TALLAFHA, Abdalla,** University of Jordan, JORDAN

*Contractions on Semi-Linear Uniform Spaces*

In 2009 Tallafha, A. and Khalil, R. defined a new type of uniform space namely, semi-linear uniform space [8]. Later Tallafha, A. in [9], [10] and [11], Alhihi,S. in [1] and Tallafha, A. and Alhihi, S. in [12], gave more properties of semi-linear uniform spaces. Also Lipschitz condition and contraction mapping on semi-linear uniform spaces are defined, which enables one to study fixed point for such functions. In this articles we shall define new types of contractions on semi-linear uniform spaces and asked the natural question if $f$ is a contraction from a complete semi-linear uniform space $(X, \Gamma)$ to it self, is f has a unique fixed point.

- **TAN, Elif,** Ankara University, TURKEY

*On the Generalized Fibonacci Quaternions and Octanions*

In this talk, we present a further generalization of the bi-periodic Fibonacci and Lucas quaternions $\{W_n\}$ as:

$$W_n = \sum_{l=0}^{3} \omega_{n+l} e_l, \quad n \geq 0$$

where $\omega_n = a\omega_{n-1} + \omega_{n-2}$, if $n$ is even, $\omega_n = b\omega_{n-1} + \omega_{n-2}$, if $n$ is odd with arbitrary initial conditions $\omega_0$, $\omega_1$ and nonzero numbers $a, b$. They are emerged as a generalization of the best known quaternions in the literature, such as classical Fibonacci and Lucas quaternions, Pell and Pell-Lucas quaternions, modified Pell quaternions, $k-$ Fibonacci and $k-$Lucas quaternions. We give the generating function, the Binet formula, and some basic properties of these quaternions. Finally, we introduce the generalized bi-periodic Fibonacci octanions as an analog to these quaternions, and give some basic properties of them.

● **YUCE, Ali, TAN, Nusret,** Inonu University, TURKEY

*Examining of Numerical Methods in Time Response Analysis of Fractional Order Systems with Long Settling Time*

Fractional order systems have been a major research topic in the last few decades. One of the most important reason for this, a real systems can be modelled better by using fractional order differential equation. However, computing analytical time responses such as unit impulse and step responses is still a difficult problem in fractional order systems. Therefore, integer order approximation methods (Oustaloup's method, Matsuda's method) and some numerical methods (Grunwald-Letnikov, Fourier series method, inverse Fourier transform method) are used for computation of time responses. On the other hand, computation time of time responses by using Matlab is also important because the computation time may be too long for some systems such as systems with large time delay and big inertia. Temperature systems are given as an example for this systems. In this study, computation time of time responses is investigated by testing different numerical approximation method for fractional order control systems with long settling time.

● **IMAMOGLU, Neslisah*, GURARSLAN, Gurhan**, TANOGLU, Gamze*, YILMAZ, Yasin**,** *Izmir Institute of Technology, TURKEY, **Pamukkale University, TURKEY

*Frechet Derivative Based Linearization Method for Burgers-Type Equations*

A localized differential quadrature rule combined with general Frechet derivative is proposed for the first time to solve Burgers-type equation. By using the Frechet derivative, the nonlinear equation is converted into a set of linear algebraic equations which are solved iteratively. The effectiveness of this method has been demonstrated through a number of examples. Moreover this new method can be applied to new range of nonlinear partial differential equation.

● **TAS, Emre*, YURDAKADIM, T.**,** *Ahi Evran University, TURKEY, ******Hitit University, TURKEY

*Korovkin Theory for Extraordinary Test Functions by A-Statistical Convergence*

Korovkin-type theorems provide simple and useful tools for determining whether a given sequence of positive linear operators, acting on some function spaces, converges to the identity operator. The classical Korovkin theorem states the uniform convergence of positive

linear operators in C[*a,b*] by providing the convergence only on three test functions {1,$e_1$, $e_2$}. Korovkin-type theorems have been extended in several directions with the aim of finding other subsets of functions, called Korovkin subsets, i.e., satisfying the same property as {1,$e_1$, $e_2$}; establishing the same results in abstract Banach spaces. Another direction is to consider more general type of convergences such as convergence generated by a regular summability matrix method, statistical and filter convergence. In this paper we introduce A − statistical Korovkin subset for T and characterize that a subset of $C_0(X)$ is an A − statistical Korovkin subset for T. We also give examples of A − statistical Korovkin subsets for identity operator.
Acknowledgments: This work was supported by the Ahi Evran University Scientific Research Projects Coordination Unit. Project Number: FEF.A3.16.033

● **TAS, Engin, GOKCE, Baris,** Afyon Kocatepe University, TURKEY

*Egg's Grade Classification using an Online Pairwise Support Vector Machine*

Egg is among the most important sources of protein in nutrition, thus egg production industry is one of the largest industries in many countries. Accurate automatic grading of eggs from poultry is critical for improving and speeding up the egg production process. This is also important in terms of hygienic production environment. This paper proposes a different approach for classification of eggs into grades. An online pairwise support vector machine is adapted to work with pairs of eggs. This pairwise model is able to identify whether a pair is a positive pair or not, where a positive pair formed by two eggs from the same grade and a negative pair formed by two eggs from different grades. Classification performances of this approach and classical SVM are compared and results indicate that the pairwise setting outperforms the classical SVM significantly.

● **TAS, Engin,** Afyon Kocatepe University, TURKEY

*A Fast Gradient Descent Method for Learning to Rank*

Any ranking problem that minimizes a pairwise ranking error can be represented by a system of linear equations. We propose to develope a fast version of gradient descent algorithm for learning ranking functions by solving this system of linear equations. Tikhonov regularization is also integrated in this framework to avoid overfitting problems where we have very large and high dimensional, but sparse data.

● **TASAR, Beyda, GULTEN, Arif, YAKUT, Oguz,** Firat University, TURKEY

*Dynamic Anaysis of Five Finger 15 Dof Hand*

People may lose limbs because of injuries, medical conditions or congenital hereditary disorders. To design the best functionality prosthesis hand, which mimics the biological hand's motion, all information about the characteristics and motion capabilities of the biological hand must be known. Biological hand movement includes separate control of five with three independent joints. Thus, dynamics analysis of the human hand is the extremely complex. The aim of this paper is to provide a summary of the dynamic characteristics of the human hand as a preliminary step towards the development of robotic hands. Researches about dynamic model of hand mechanisms are widely carried out for variety of hand pattern. In this study dynamic analysis results is demonstrated for six hand pattern which are hand opening , hand close, thumb- index touch, thumb – middle touch, thumb – ring touch, thumb-

pinky touch. Firstly dynamics model are presented for a finger; with anthropometric data. Lagrange method was used to derive the dynamics. Dynamics model of hand were simulated to understand its behavior in MATLAB /SIMULINK.

● **TAYLAN, Pakize*, UYSAL, Ersin*, WEBER, Gerhard-Wilhelm**, ***Dicle University, TURKEY**, ****Middle East Technical University, TURKEY

*A Comparative Study on Classification by Nonparametric Regression*

Classification is the process of organizing data into different categories for its most effective and efficient use according to some constraints given dataset related to any science and application, ranging from Engineering, Medicine, Natural, Bio- and Earth Sciences to Economics, Finance and Social Sciences. The objective of this research is to give a contribution to well-known classification methods such a Generalized Additive Logistic Regression Model (GALRM) by using B-Splines as smooth functions in it, and to compare the relative performance of GALRM and Generalized Linear Model in the course of our approach based on the some different datasets. The paper ends with a conclusion and an outlook to future studies.

● **KARACA, Ismet, TEMIZEL, Gokhan,** Ege University, TURKEY

*Digital Khalimsky Manifolds*

Khalimsky's topology, defined on the integers, is a digital counterpart of Euclidean topology which is defined on the real line. Digital Khalimsky manifolds, which are locally homeomorphic to Khalimsky n-space, are digital surfaces. Erik Melin has studied digital Khalimsky manifolds and given different definitions. We have used these manifolds for determining to digital responses of the images on the Euclidean geometry. In this poster, we will explain how to establish definition of digital Khalimsky manifolds.

● **TENREIRO MACHADO, Jose A.** , Institute of Engineering, Polytechnic of Porto, PORTUGAL

*Application of Fractional Calculus in Engineering Sciences*

Fractional Calculus (FC) started in 1695 when L'Hôpital wrote a letter to Leibniz asking for the meaning of $D^n y$ for $n = 1/2$. Starting with the ideas of Leibniz many important mathematicians developed the theoretical concepts. During the thirties A. Gemant and O. Heaviside applied FC in the areas of mechanical and electrical engineering, respectively. Nevertheless, these important contributions were somehow forgotten and only during the eighties FC emerged associated with phenomena such as fractal and chaos and, consequently, in the modeling of dynamical systems. In the last years FC become a 'new' tool for modeling and control dynamical systems. Based on the FC mathematical concepts, this lecture starts by introducing the FC fundamental historical and mathematical concepts. In a second part the lecture reviews the main approaches for implementing fractional operators and presents several applications in the areas of modeling and control, namely fractional PID, fractional electrical impedances, robotics, nonlinear system control, and finance dynamical analysis.

● **UGARTE, Juan P.***, **TOBON, Catalina**, LOPES, Antonio M.*** , TENREIRO MACHADO, Jose A.****,** *Universidad Pontificia Bolivariana, COLOMBIA, **Universidad de Medellin, COLOMBIA, ***Universidade do Porto, PORTUGAL, ****Institute of Engineering Polytechnic of Porto, PORTUGAL

*Mathematical Model for Atrial Electrical Propagation Based on Complex-Order Spatial Derivatives*

The computational simulation of the action potential allows the quantitative characterization of cardiac electrophysiological dynamics. The design and analysis of scenarios, that would be complex and demanding for experimental implementation, is feasible by means of the mathematical description of cardiac pathologies. Important advances in atrial fibrillation modelling have been made, but its mathematical description needs to be enhanced to reduce its simplification originally assumed and to adequately fit experimental data. In this work, we propose a new model of the atrial electrical propagation based on complex-order spatial derivatives. The Courtemanche atrial cell membrane formalism is implemented, and a 2D domain is designed for representing atrial tissue. After initiation of propagation, we assess the effect of the order $\gamma = \alpha + i\beta$, both in the action potential morphology and in its pattern of propagation. Our results show that $\gamma$ modifies the electrophysiological characteristics of an atrial tissue at the micro and mesoscopic scales.

● **TOKER, Kemal G. , YUKSEL, Seniha E. ,** Hacettepe University, TURKEY

*Hyperspectral Unmixing via Convolutional Neural Network*

Hyperspectral imaging sensors provide image data containing both spatial and detailed spectral information. However, due to low spatial resolution or to the presence of intimate mixtures in the scene, the spectral information acquired by the hyperspectral sensors are actually mixtures of the spectral signatures of the materials. These mixtures are modelled as linear or nonlinear in literature. In this study, convolutional neural network is proposed for linear hyperspectral unmixing. The spectral signatures of some materials, taken from ASTER and USGS spectral libraries, are used to construct specific libraries with different size to be used in the experiments. These signatures in the constructed library are used to obtain synthetic mixture pixels within the framework of the linear mixture model. These mixture pixels are used to train convolutional neural network. The trained convolutional neural network is used to find which signatures are in the mixed test pixel and estimate the corresponding fractional abundances. Also, the effects of the number of training data, the level of noise, the size of the constructed library on unmixing performance are investigated. It has been shown that promising unmixing results have been achieved by using convolutional neural network.

● **TOKMAK FEN, Fatma* , FEN, Mehmet O.**,** *Gazi University, TURKEY, **TED University, TURKEY

*Chaotic Dynamics of SICNNs on a Time Scale*

In this study, we investigate chaotic dynamics of shunting inhibitory cellular neural networks (SICNNs) on a time scale, which is a union of infinitely many disjoint compact intervals. It is rigorously proved that SICNNs exhibit chaotic outputs if external inputs are chaotic. The theoretical results are supported with simulations.

● **TOLLU, Durhasan T. ,** Necmettin Erbakan University**,** TURKEY

*On a Solvable Nonlinear Difference Equation of Higher Order*

In this study, we mainly discover solvability of the higher-order nonlinear difference equation

$$x_n = \frac{a + x_n x_{n-k}}{x_n + x_{n-k}}, n \in \mathbb{N}_0 ,$$

which is studied in [1], and solve it in closed form. This equation stems from some equations of order two and three posed in [2, 3]. By using the obtained closed form of the solution, we verify the results on the equation and extend these results to negative semi-axis, too. Also, we investigate existence of the solutions.

● **TUNA, Huseyin*, PASAOGLU, Bilender**, ***Mehmet Akif Ersoy University, TURKEY, ******Suleyman Demirel University, TURKEY

*Basis Properties of the Root Functions of Non-Self Adjoint q-Sturm-Liouville Problems*

In this work, we consider the q- analogue of the Sturm-Liouville problem. Using the asymptotic behavior at infinity for its eigenvalues, we prove that the system of root functions of this operator forms a Bari bases.

● **TUNA, Huseyin*, PASAOGLU, Bilender**, ***Mehmet Akif Ersoy University, TURKEY, ******Suleyman Demirel University, TURKEY

*Spectral Analysis of q-Fractional Sturm-Liouville Operators*

In this work, we study q-Fractional Sturm-Liouville operators. Using by functional method, we pass to a new operator. Then showing that this new operator is a maximal operator and constructing a selfadjoint dilation of the maximal dissipative operator, we proved a theorem on completeness of the system of eigenvectors and associated vectors of the dissipative q-Fractional Sturm-Liouville operators.

● **TUNA, Huseyin*, PASAOGLU, Bilender**, ***Mehmet Akif Ersoy University, TURKEY, ******Suleyman Demirel University, TURKEY

*Non-Selfadjoint Sturm-Liouville Operators with a Spectral Parameter in the Boundary Condition on Time Scales*

In this work, we consider a non self adjoint Sturm--Liouville operator with a spectral parameter in the boundary condition on bounded time scales. We construct a self adjoint dilation of the dissipative Sturm-Liouville operators. We prove a theorem on completeness of the system of eigenvectors and associated vectors of this operators.

● **TUNC, Tuba, BUDAK, Huseyin, USTA, Fuat, SARIKAYA, Mehmet Z. ,** Duzce University**,** TURKEY

*On Hermite-Hadamard Type Inequality for h-Convex Functions on Fractal Set*

In this paper, we establish a new Hermite-Hadamard type inequality using h− convex functions on fractal set. Then, we present some special cases of proposed inequalities which can be deduced from our main result.

● **TURKAN, Ayca H.*, CALIS, Nazif**, ***Afyon Kocatepe University, TURKEY, ******Adıyaman University, TURKEY

*A Mixture Model of Two Bivariate Weibull Distributions: An Application Study*

For bivariate lifetime data which occur in many areas including medicine, biology, engineering, and demography, the Marshall-Olkin bivariateWeibull (MOBW) distribution and the Block-Basu bivariate Weibull (BBBW) distribution can be used. However, these distributions are not adequate when the data are heterogeneous. For heterogeneous data sets, mixture distribution models are nice tools for the modeling of a wide variety of random phenomena. With this motivation, in this paper using MOBW and BBBW distributions, a new finite mixture bivariate model is presented. The proposed mixture model is called Mix BW. In order to obtain the mixture model parameters estimation, expectation maximization (EM) algorithm is used with an adapted form which is Mix EM algorithm. The applicability of the proposed Mix BW distribution is showed on the generated data sets with different sample sizes and different parameter values for illustrative purpose. This paper also includes the analysis of a real data set and simulation study. Both simulation study and real data analysis show that the Mix EM algorithm achieves satisfactory results.

● **UNVER, Mehmet, TURKARSLAN, Ezgi,** Ankara University, TURKEY

*A Theoretical Approach for Identification of a Fuzzy Measure that is Subadditive over Singletons*

In multicriteria decision making (MCDM) environment fuzzy measure theory has an important role. However, identification of the fuzzy measure is not an easy process due to the exponential number of the subsets. In this talk to achieve this complexity we consider a particular set function which depends on densities of singletons with interdependence coefficients and which provides redundancy among the singletons to achieve this complexity. We obtain the Möbius representation of this function and then we present independent necessary and sufficient conditions to attain a fuzzy measure from this set function. Finally, these conditions are discussed and also supported with explanatory numerical MCDM examples.

● **TURKSEN, Ozlem,** Ankara University, TURKEY

*Inferences on Fuzzy Linear Model Parameter Estimates by Using Bootstrap Method for Replicated Response Measures*

Fuzzy linear regression analysis can be considered as a proper fuzzy modeling tool for the data set with replicated response measures since the replications cause uncertainty. It is

possible to deal with this uncertain structure by using fuzzy numbers. In this study, replicated response measures are presented as triangular type-1 fuzzy numbers. Fuzzy least squares (FLS) approach, constructed on minimizing the sum of squares of fuzzy errors, is applied to estimate the parameters of fuzzy linear regression model. Here, the model parameters are also considered as fuzzy numbers but the inputs are taken as crisp numbers. The main contribution of the study is making inferences for the fuzzy model parameter estimates by using bootstrap method based on resampling fuzzy errors. A data set is used to illustrate the application of bootstrap method for inferences on fuzzy parameter estimates.

● **TURKSEN, Ozlem*, ERGINEL, Nihal**, SENTURK, Sevil**, ***Ankara University, TURKEY, **Anadolu University, TURKEY

*A Proper Method for Fuzzy Parameter Estimation of Linear Model with Replicated Response Measures*

Statistical regression analysis is considered as a basic modeling tool for defining the analytical relationship between input and response variables in various fields, such as engineering, agriculture, business and economics. The statistical linear regression analysis is bounded by some assumptions that the data should be crisp and should follow Gaussian assumption. Sometimes, the data set may have small number of observations and may be composed of replicated response measures. The replicated response measures of a response can be defined as fuzzy numbers due to their uncertain structure. In this case, regression analysis based on fuzzy set theory can be proper to cope with uncertainties on the replicated response measures. In this study, the replicated response measures are considered as triangular type-1 fuzzy numbers. Fuzzy linear regression analysis, based on fuzzy least squares method, is applied on the replicated response measured data set. In proposed fuzzy regression model, the model coefficients are also considered as triangular type-1 fuzzy numbers whereas the input variables are crisp. The main contribution of the study is obtaining the fuzzy parameter estimates based on fuzzy least squares (FLS) approach with considering the fuzzy nature of the response data through the proper fuzzy arithmetic operators. A real data set example is used for the application purpose of the proper fuzzy least squares approach.

● **BALEANU, Dumitru*,**, UGURLU, Ekin*, ***Cankaya University, TURKEY, **Institute of Space Sciences, ROMANIA

*On Dissipative Fractional Operators*

In this work, the location of the complex eigenvalues of two dissipative boundary value problems are investigated with the help of the dissipative operators. For this purpose, we construct Hilbert spaces and operators associated with the boundary value problems acting on that spaces. Then using direct calculations we obtain that the operators are dissipative. Finally, using the well known result on dissipative operators we infer the results on location of eigenvalues of the boundary value problems.

● **UGURLU, Ekin*, BAIRAMOV, Elgiz**,** *Cankaya University, TURKEY, ******Ankara University, TURKEY

*Bessel-Type Dissipative Operators with Transmission Conditions*

In this work, we investigate the spectral properties of a Bessel-type operator together with boundary and transmission conditions. We construct a suitable Hilbert space with a special inner product. Then we show that the operator corresponding with the problem is a dissipative operator. With the help of Krein's theorem on completeness we give a complete information about the boundary-value-transmission problem.

● **UGURLU, Ekin*, P. ALLAHVERDIEV, Bilender**,** *Cankaya University, TURKEY, ******Suleyman Demirel University, TURKEY

*On the Dissipative Extension of a Direct-Sum Differential Operator*

In this work, we consider a differential operator defined on two different intervals. We handle this operator as a direct-sum differential operator on the whole interval. We give the boundary conditions to make the direct-sum operator a dissipative extension of the minimal differential operator. This construction is done with the aid of the boundary values. Finally we give a complete spectral information for the dissipative operator using Pavlov's method.

● **ULUSOY ADA, Gulsum*, ACAR, Tuncer**, ***Cankiri Karatekin University, TURKEY, **Kirikkale University, TURKEY

*A New Durrmeyer Type Modification of Szasz Mirakyan Operators*

The aim of this article is to introduce Durrmeyer type modification of the operators defined in [3]. The construction of new operators is based on a speci.c function. We prove that the new operators are an approximation process for the function belong to weighted space and we shall prove uniform convergence of the operators. Moreover we obtain local approximation properties. Last section is devoted to a quantitative Voronovskaya theorem.

● **ULUSOY ADA, Gulsum,** Cankiri Karatekin University, TURKEY

*On Approximation Properties of Generalized Durrmeyer Operators*

In the present talk, we initiate some convergence properties of generalized Durrmeyer operators which are a wide class of linear positive operators including many well known linear positive operators. We investigate Voronovskaya type asymptotic formula for derivatives of functions by the corresponding order of derivatives of operators. Then we give an error estimate in simultaneous approximation by the generalized operators.

● **URLU, Nurten*, CEVIK, A. Sinan**, CANGUL, I. Naci***, ***Cankaya University, TURKEY, **Selcuk University, TURKEY, ***Uludag University, TURKEY

*Gröbner-Shirshov Basis on A Special Semigroup*

The Gröbner-Shirshov basis theory was developed by A.I. Shirshov for Lie algebra [5] and B. Buchberger for commutative algebras [4]. It was also generalized by G. M. Bergman [2] and

L. A. Bokut [3] to the case of associative algebras. This theory is very useful in the study of presentations of associative algebras, Lie algebras, semigroups and groups by generators and defining relations(see [1]). It is also a powerful tool to solve many problems; normal form, Word problem, embedding theorems, ets. In this work, we obtain Gröbner-Shirshov bases and normal forms of pure virtual braid group.

● **USTA, Fuat*, BUDAK, Huseyin*, SARIKAYA, Mehmet Z.*, YILDIRIM, Huseyin**, ***Duzce University**,** TURKEY, **Kahramanmaras Sutcu Imam University**,** TURKEY

*Some Hermite-Hadamard and Ostrowski Type Inequalities for Fractional Integral Operators with Exponential Kernel*

In this paper, we firstly establish Hermite-Hadamard type integral inequality for fractional integral operators. Secondly, we give new generalization of fractional Ostrowski type inequalities through convex functions via Holder and power means inequalities. In accordance with this purpose we have used the fractional integral operators with exponential kernel.

● **PISKIN, Erhan, UYSAL, Turgay,** Dicle University, TURKEY

*Blow Up of Solutions for a System of Nonlinear Higher-Order Kirchhoff-Type Equations with Nonlinear Damping*

In this work studies the initial boundary value problem for the Kirchhoff-type equations with nonlinear damping terms. We study the blow up of the solution with negative initial energy by using the technique of [2]. Also, we prove the blow up of the solution with positive initial energy by using the technique of [5] with a modification in the energy functional due to the different nature of problems.

● **WANI, Khalid, Khanday, M. A. ,** University of Kashmir, INDIA

*Mathematical and Numerical Analysis of Thermal Disturbance on Cancerous Tissues Under the Local Heat Therapy*

The purpose of this study is to investigate the thermal behaviour of living tissues in presence of spatial external heat source. An effort has been made to formulate the mathematical model to study the temperature distribution in invivo tissues of the human body. The mathematical formulation is governed by the bio-heat equation together with appropriate initial, boundary and interface conditions. The solution of the model was carried out using variational finite element method and computational simulations. The model describes the exchange of heat between the internal biological tissues and other surrounding media. The effect of external heat source under different conditions of atmospheric temperature and as a local hyperthermic method provides an important information to the temperature regulation in biological tissues under normal and malignant conditions. Thermal fluctuations at the targeted regions were obtained with respect to various time dependent heating sources and scattering coefficients. The results obtained may be helpful for clinical purposes especially in the treatment of cancerous tumors through radiotherapy and other local hyperthermic approaches.
Acknowledgement: The authors are highly thankful to the UGC for their financial support under the grant of Major Research Project.

● **WEBER, Gerhard-Wilhelm, SAVKU, Emel, YOLCU-OKUR, Yeliz, KESTEL, A. Sevtap,** Middle East Technical University, TURKEY

*Optimal Control Under Stochastic, Impulsive, Regime Switching and Paradigm Shifting Environments in Economics and Finance*

We introduce hybrid stochastic differential equations with jumps and to its optimal control. These hybrid systems allow for the representation of "random" and impulsive regime switches or paradigm shifts in economies and societies, and they are of growing importance in the areas of finance, science, development and engineering and, in future, also in medicine. We present special approaches to this stochastic optimal control: one is based on the finding of optimality conditions and closed-form solutions. We further discuss aspects of information asymmetries, given by delay or insider information.

● **WU, Guo-Cheng*, BALEANU, Dumitru**,** *Neijiang Normal University, CHINA, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*Discrete Time Control for Fractional Systems–Lyapunov Direct Method*

Many nonlinear phenomena's evolution only happens on discrete time or hold discrete structures. These applications involves theories of discrete time control. This talk introduces some new results in discrete fractional systems. The stability of Caputo delta fractional difference equations is investigated. Solutions' monotonicity and asymptotic stability of a linear fractional difference equation are discussed. A stability theorem for a discrete fractional Lyapunov direct method is proved. Furthermore, an inequality is extended from the continuous case and a sufficient condition is given. Some linear, nonlinear and time varying examples are illustrated and the results show wide prospects of the stability theorems in fractional control systems of discrete time.

● **WU, Quanying, FAN, Junliu, CHEN, Baohua, WANG, Zhenya,** Suzhou University of Science and Technology, CHINA

*Research on the Complicated Aperture Imaging System*

High-resolution space remote sensor requires a large aperture optical system which is limited by aspects in terms of material, manufacturing, processing and launching. Complicated pupil optical system overcomes such problems as design, manufacturing and launching of a large aperture optical system, and therefore is applied in the space telescope. Large apertures are replaced by complicated pupils in specific alignments, which are capable of achieving the same resolution while reducing the weight of the total optical system. Error detection and control of complicated pupil's sub-mirrors is a key. On the basis of the traditional Phase Diversity(PD) method, we put forward a new method which adjusts the intial conditions of the algorithms according to the assembly errors and effections of outside conditions to improve the accuracy of the error calcultion.The final image quality is studied because of initial conditions by ZEMAX simulation. A three sub-mirrors reflective telescope is designed, and images with a specific phase difference are captured through a phase component. According to the improved PD method, the experimental research of the complicated pupil co-phase detection and control will be carried out.

● **YAKHNO, Valery,** Dokuz Eylul University, TURKEY

*Waves in Magneto-Electro-Elastic Media as Solutions of a Symmetric Hyperbolic System*

A new approach for the study of dynamics of the wave propagation in anisotropic non-homogeneous magneto-electro-elastic media with electromechanical coupled effect is considered in the paper. This approach consist of the reduction of basic coupled constitutive relations and equations for anisotropic magneto-electroelastic solid to a symmetric hyperbolic system of the partial differential equations of the first order. The existence, uniqueness and stability estimate theorems in Sobolev's spaces for the solutions of the initial value problems of these systems are the main results of the paper. These results have been obtained by application of the theory and methods of symmetric hyperbolic systems.

● **YAMAN, Gulsen, AVCI, Derya, ALTAY, Ramazan,** Balikesir University, TURKEY

*Predicting Air Temperature Distribution in the Vicinity of a Dry Resin Type Transformer Using Fractional Partial Differential Equations*

Correct predictions are very important for development of a complicated system. Upper temperature limits in the vicinity of a dry resin type transformer are one of the most important parameters for design and development of such transformers. But determination of these important parameters often require costly tests and time-consuming computations. Thermal models defined by fractional partial differential equations are providing some promising results for these type of engineering problems. A simplified model and some experimental results are compared for this purpose.

● **YANG, Xiao-Jun*, GAO, Feng*, BALEANU, Dumitru**,** *China University of Mining and Technology, CHINA, **Cankaya University, TURKEY & Institute of Space Sciences, ROMANIA

*A New Integral Transform with Applications to Maxwell and Voigt –Kelvin Elements Involving Fractional Derivatives of Caputo and Riemann-Liouville Types*

In this paper, we consider the rheological models involving the Caputo and Riemann-Liouville fractional derivatives. A new integral transform is used to handle the fractional differential equations. The creep and relaxation behaviors for the mathematical models are discussed.

● **AMIOUR, Moufida, YAROU, Mustapha F. ,** Jijel University, ALGERIA

*Invariant Systems with Dissipative Set-Valued Maps*

This paper is devoted to the study of the strong and weak invariance property of a system (S,F) where S is a closed subset of a Hilbert space H, and F an autonomous set-valued mapping defined on H; under a dissipative condition. We give a characterization of "approximate" strongly and weakly invariant systems in H and state the equivalence between week and strong invariance in finite dimensional setting.

● **YASAR, Emrullah, YILDIRIM, Yakup,** Uludag University, TURKEY

*On The Solutions and Conservation Laws of (2+1)-Dimensional Breaking Soliton Equation*

In this paper, we consider a (2+1)-dimensional breaking soliton equation [1] which describe the (2+1)-dimensional interaction of the Riemann wave propagating along the y-axis with a long wave along the x-axis. By the Lie group analysis [2], the Lie point symmetry generators and symmetry reductions were deduced. From the viewpoint of exact solutions, we have performed two distinct methods to the equation for getting some exact solutions. Kudryashov's simplest methods [3] and ansatz method [4] with the assistance of Maple were carried out. The local conservation laws are [1] also constructed by multiplier/homotopy methods. Finally, the graphical simulations of the exact solutions are depicted.

● **YASAR, Emrullah, YILDIRIM, Yakup,** Uludag University, TURKEY

*Application of Multiple Exp-Function Method to Nonlinear Evolution Equations*

In this work, we performed the multiple exp-function [1] scheme for the (2+1) dimensional Sawada.Kotera (SK) equation [2] and (3+1)-dimensional nonlinear evolution equation [3] and analytic particular solutions have been deduced. The analytic particular solutions contain one-soliton, two-soliton and three-soliton type solutions. With the assistance of Maple, we demonstrate the efficiency and advantages of the procedure that generalizes Hirota's perturbation scheme [4]. The obtained solutions can be used as benchmark for numerical solutions and describe the physical phenomenas of behind the models.

● **YAVUZ, Enes,** Manisa Celal Bayar University, TURKEY

*On The Statistical Weighted Mean Summability of Slowly Decreasing Sequences of Fuzzy Numbers*

The aim of this study is to show that statistical Cesaro and statistical logarithmic weighted mean summability of slowly decreasing sequences of fuzzy numbers imply convergence in the space of fuzzy numbers.

● **YAVUZ, Enes,** Manisa Celal Bayar University, TURKEY

*Tauberian Theorems for Lambert and Zeta Summability Methods in Fuzzy Number Space*

We extend Lambert and zeta summability methods to space of fuzzy numbers and prove Tauberian theorems for Lambert and zeta summability methods of fuzzy numbers, the one for zeta summability providing a new proof when the sequence is of real numbers.

● **YAVUZ, Mehmet*, OZDEMIR, Necati**, ***Necmettin Erbakan University, TURKEY, **Balıkesir University, TURKEY

*Numerical Solutions of Fractional Partial Differential Equations by Using Laplace Transform*

In this paper, we aim a numerical method for solving some interesting one-dimensional time-fractional partial differential equations (PDEs). This method is based on the Laplace

homotopy perturbation method (LHPM), which is combined form of the Laplace transform and the HPM. Firstly, we have applied to the fractional one-dimensional PDEs by using He's polynomials. Then we have used Laplace transform method and discussed how to solve these PDEs by using LHPM. We have declared that the proposed model is very efficient and powerful technique in finding approximate solutions to the fractional PDEs.

● **YELKENCI, Hasan C. , SEL, Cagri,** Karabuk University, TURKEY

*A Constraint Programming Model for the Flow Shop Scheduling Problem*

Production performance measures and their weights are varied by production type and costs, product's added-value, globalized world's demands and conditions. Today's indispensable performance criterion is shaped around terms customer satisfaction and service quality. Hereby, we aim at minimizing the number of tardy jobs in a production scheduling problem. In this study, a constraint programming model is proposed to solve the flow shop scheduling problem with the sequence-dependent setup times. Numerical analyses are conducted introductory by a hypothetical case. As an overall remark, we observed that the constraint programming model is a useful method providing solutions in a reasonable time.

● **MERT KANTAR, Yeliz, YENILMEZ, Ismail, ACITAS, Sukru,** Anadolu University, TURKEY

*Estimation Based on Generalized Logistic Distribution for the Censored Regression Model*

The censored regression model, known as the tobit model, has become quite common in econometric literature for the censored dependent variable. However, since the tobit model depends on normal distribution, its estimation in the case of non-normal errors is inconsistent. To solve this problem, fully adaptive or quasi-maximum likelihood estimators have been proposed. For the censored regression model, we introduce a partially adaptive estimator based on the generalized logistic distribution, which is flexible than normal distribution and also approximates to normal distribution for the special parameter case. Simulation study is conducted to evaluate the performance of the considered estimator with the well-known estimator of the Tobit model for different error distributions and different sample sizes. It is observed that partially adaptive estimator based on the generalized logistic distribution performs well for small sample sizes and has little efficiency loss in the case of normal distribution relative to the Tobit.

● **SAGIR, Selcuk*, YESIL, Ali**,** *Mus Alparslan University, TURKEY, ******Firat University, TURKEY

*The Relation Between the Refractive Index of the Equatorial Ionospheric F2 Region and Long-Term Solar Indices*

Ionospheric refractive index is especially important in the reflection and propagation of HF (3-30 MHz) waves from the ionosphere. For this reason, in this study, the relation between the real parts ($\mu_0^2$, $\mu_x^2$ and $\mu_p^2$) of the refractive index computed as based on the direction of the Earth's magnetic field for 300 km altitude for the equatorial ionospheric F2 region and the long-term solar indices (Sunspot Number-R12, Solar Flux at 10.7cm -F10.7, Coronal Mass Ejection-CME) has been examined by using the multiple regression model. As a result of the

examinations, it has been determined that there is a very strong relation between the three refractive index values and solar indices. While it was determined that the R12 and F10.7 indices have a very strong relation, it was also determined that CME did not have a statistically significant relation. This insignificant situation may only be explained with the magnetic field of the Earth acting like a shield.

● **YESIL, Ali*, SAGIR, Selcuk**, ***Firat University, TURKEY, **Mus Alparslan University, TURKEY

*The Compare of Conductivity Tensor of Cold and Warm Plasma for Equatorial Ionospheric F2 Layer in the Equinox Days*

We compared the conductivity tensor becoming important parameter of ionospheric plasma by using the real geometry of Earth's magnetic field for Northern hemisphere for both cold and warm ionospheric plasma. It could be that the conductivity tensor certainly depend on the vector of wave propagation (**k**) and the adiabatic sound speed ($U_e$) in warm ionospheric plasma and the adiabatic sound speed for electron generally decrease the magnitudes of conductivity tensor components with respect to the cold ionosphere plasma except for $\sigma'_{23R}(U_e\neq0)=\sigma_{23R}(U_e=0)$, $\sigma'_{33R}(U_e\neq0)=\sigma_{33R}(U_e=0)$, $\sigma'_{13S}(U_e\neq0)=\sigma_{11S}(U_e=0)$ and $\sigma'_{33S}(U_e\neq0)=\sigma_{33S}(U_e=0)$. In this sense, the resistivity and reactance increase any medium. Moreover, the change of conductivity with local time is similar to change of electron density with local time for both conditions in ionospheric plasma as trend.

● **ADILOV, Gabil*, YESILCE, Ilknur**,** *Akdeniz University, TURKEY, ******Mersin University, TURKEY

*Hermite-Hadamard Inequality Involving Riemann-Liouville Fractional Integral for $\mathbb{B}$-convex Functions*

Let $U \subset \mathbb{R}^n$. A function $f: U \to \mathbb{R} \cup \{\pm\infty\}$ is called a $\mathbb{B}$-convex function if $epi(f) = \{(x,\mu) | x \in U, \mu \in \mathbb{R}, \mu \geq f(x)\}$ is a $\mathbb{B}$-convex set [1, 2]. In this work, we handle the Hermite-Hadamard Inequality that is one of the most important applications of convex functions in Theory of Inequality [3, 4, 5, 6]. For $\mathbb{B}$-convex function, we give Hermite-Hadamard Inequality involving fractional integral.

● **BAIRAMOV, Elgiz, YILDIRIM, Emel,** Ankara University, TURKEY

*Bound State and Spectral Singularities of Impulsive Schrödinger Equation*

In this work, we study the analytical properties of the Jost function of impulsive Schrödinger equation. We also investigate of bound states and spectral singularities of this equation. We obtain the conditions on the potential function, under which impulsive Schrödinger equation has a finite number of bound states and spectral singularities with finite multiplicities.

● **YILDIRIM, Umit*, ATCEKEN, Mehmet*, DIRIK, Suleyman**,** *Gaziosmanpasa University, TURKEY, **Amasya University, TURKEY

*Pseudo Projective Curvature Tensor Satisfying Some Properties on a Normal Paracontact Metric Manifold*

In the present paper we have studied the curvature tensor of a normal paracontact metric manifold satisfying the conditions $R(\xi,X)\tilde{P}=0, \tilde{P}(\xi,X)R=0, \tilde{P}(\xi,X)\tilde{P}=0,$ $\tilde{P}(\xi,X)S=0, \tilde{P}(\xi,X)\tilde{Z}=0$ and pseudo projective flat, where $R$ is Riemannian curvature tensor, $\tilde{P}$ is pseudo projective curvature tensor, $S$ is Ricci tensor and $\tilde{Z}$ is concircular curvature tensor.

● **YILDIZ, Sebnem,** Ahi Evran University, TURKEY

*A Matrix Application of Convex Sequences to Fourier Series*

By using a convex sequence Bor [H. Bor, Local properties of factored Fourier series, Appl. Math. and Comp., 212 (2009) 82-85] has obtained a result dealing with local properties of factored Fourier series for weighted mean summability. In this work, we have generalized that result for absolute matrix summability factors.
Acknowledgments: This work supported by the Ahi Evran University Scientific Research Projects Coordination Unit. Project Number: FEF. E2.17.013

● **YILMAZ, Semih, TAN, Elif,** Kırıkkale University, TURKEY

*Bi-Periodic Fibonacci and Lucas Quaternions*

In this talk, we present a new generalization of the Fibonacci and Lucas quaternions $\{Q_n\}$ and $\{P_n\}$ as:

$$Q_n=\sum_{l=0}^{3} q_{n+l}e_l \quad \text{and} \quad P_n=\sum_{l=0}^{3} p_{n+l}e_l\,, \qquad n>0$$

respectively. Here $q_n$ and $p_n$ are the $n$-th bi-periodic Fibonacci and Lucas numbers. We give the generating function and the Binet formula for these quaternions. By using Binet formula, we obtain some well-known results.

● **YILMAZ, Nurullah, SAHINER, Ahmet,** Suleyman Demirel University, TURKEY

*A New Smooth and Descent Method for Global Optimization*

In this study, we consider the unconstrained global minimization of continuously differentiable functions. We study on the a new global optimization method “smooth and descent method” based on the auxiliary function approach. First, we propose a new parameter free smooth and descent function. Second, we design a new global optimization algorithm. Third, we investigate the numerical stabilization of the proposed method according to the parameter changes in the algorithm. Finally, we demonstrate the efficiency and effectiveness of the proposed algorithm on test problems and compare with the existing methods.

● **YOKUS, Asif, BULUT, Hasan,** Firat University, TURKEY

*On the Numerical Solutions of Finite Difference Method to the Cahn-Allen Equation*

This study is devoted to apply the modified $exp\left(-\Omega\left(\xi\right)\right)$ expansion function method to the Cahn-Allen equation by providing new analytical solutions. It is observed that this analytical solution is fulfilled the Cahn-Allen equation. In addition, the finite difference method (FDM for short) and operators are analyzed. Discretize equation is obtained via FDM. New initial condition for the Cahn-Allen equation is introduced by using this new analytical solution. It is shown that the FDM is stable for the usage of the Fourier-Von Neumann technique. Accuracy of the method is analyzed in terms of the errors in $L_2$ *and* $L_\infty$. Furthermore, the FDM is treated in order to obtain the numerical results and to construct a table including numerical and exact solutions as well as absolute measuring error. This comparison is supported with two and three dimensional graphics via Wolfram Mathematica 9.

● **YURDAKADIM, Tugba*, TAS, E.**, ***Hitit University, TURKEY, **Ahi Evran University, TURKEY

*Variational Approximation for Modified Meyer-König and Zeller Operators*

In the present paper we introduce modified Meyer-König and Zeller operators which coincide with the classical Meyer-König and Zeller operators if ω(x) = x. We provide sufficient conditions on the boundedness of the total variation of these operators and we also present a result which deals with the variational approximation of the new modified operators.

● **YUZBASI, Bahadir***, **ASAR, Yasin**, SIK, M. Samil*, DEMIRALP, Ahmet*,** *Inonu University, TURKEY, **Necmettin Erbakan University, TURKEY

*Pretest and Stein-Type Estimations in Quantile Regression Model*

In a linear regression model, it is usually assumed that the explanatory variables are independent of each other and error terms are normally distributed. However, data in many areas, including econometrics, survival analysis and ecology, etc. doesn't provide these assumptions. Firstly introduced in [1], quantile regression has been used to complement this deficiency of classical regression analysis and to improve the least square estimation. In this study, the full and sub-model estimators based on quantile regression [2] are introduced. Moreover, the pretest, shrinkage estimators and penalized estimations are also defined in the study. A Monte Carlo simulation study including a comparison with L1 type estimators such as lasso [3] and elastic-net [4] is designed to evaluate the performances of the estimators. A real data example is given for illustrative purposes.

● **ZAKIA, Hammouch*, T. , Mekkaoui*, A. , Atangana**, ***FST Errachidia Moulay Ismail University, MOROCCO, **University of Free State, SOUTH AFRICA

*Numerical Simulations Control and Synchronization a New Fractional-Order Chaotic System Involving Atangana-Baleanu Derivative*

In the present work, we consider a new fractional-order dynamical system, where the derivatives are taken in AB-sense. The phase portraits of the system are depicted and the

qualitative properties of the system are discussed. Next, active controllers are designed to globally stabilize the system. Moreover, numerical simulations are presented and discussed in details.

● **ZANGANA, Diyar O. M.* , OTELES, Ahmet**, ***Siirt University, TURKEY**, ****Dicle University, TURKEY

*Jacobsthal Numbers and Associated Bipartite Graphs*

A bipartite graph $G$ is a graph whose vertex set $V$ can be partitioned into two subsets $V_1$ and $V_2$ such that every edge of $G$ joins a vertex in $V_1$ and a vertex in $V_2$. A perfect matching (or 1-factor) of a graph with 2n vertices is a spanning subgraph of $G$ in which every vertex has degree 1. The enumeration or actual construction of perfect matching of a bipartite graph has many applications, for example, in maximal flow problems and in assignment and scheduling problems [1-2]. The famous integer sequences (e.g. Fibonacci, Pell and Jacobsthal) provide invaluable opportunities for exploration, and contribute handsomely to the beauty of mathematics, especially number theory [3]. In this study, we consider the relationship between Jacobsthal numbers and associated bipartite graphs.

● **ZEROUAL, Aouachria, D. , Haddad,** University of Batna1, ALGERIA

*Mathematical Modelling and Experimental Study of Aerodynamic Operation of the Savonius Rotor*

The present work on the Savonius rotor is divided into two parts. In the first part, we described a mathematical method based on a discrete vortex method applied to analyze theoretically the complex flow in and around a Savonius rotor. The deduced velocity and pressure fields lead to the mechanical and energetic performances. Calculations are performed by combining the singularity method and the discrete vortex method. The different parameters effects (as gap, wind speed, number of bound vortices, and limit between two free vortices) on the flow about the rotating and stationary rotor have been studied in original experiment which leads to a direct measurement of pressure on the rotating Savonius rotor blades was showed in the second part. The aim of this work is to explain clearly the mechanical and aero dynamical behaviour of the rotor. Early results are encour-aging and are in good agreement with experimental data reported by Z. Aouachria. The results allow to under-stand and clarify the operation of the machine and to determine the most performing rotors design.

● **BELGACEM, Fethi Bin Muhammad,** PAAET, KUWAIT

*Was an Extra Sumudu "s" too Cumbersome for Laplace?*

In this work we enumerate the various similarity aspects between the Sumudu and Laplace transforms. This is in part based on our previous chronological work, showing their duality. Furthermore we show aspects of their distinctions, as to where each may be best used application-wise.

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