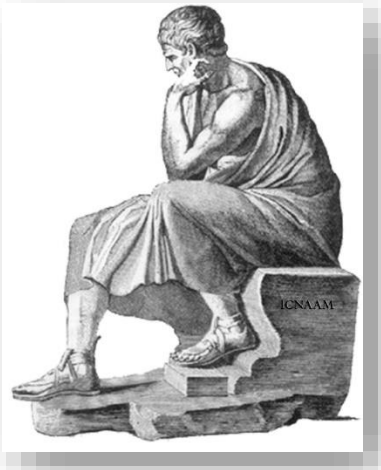
ICNAAM 2022 CONFERENCE



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ICNAAM 2022 CONFERENCE

CONFERENCE PROGRAM

19 September 2022

20 September 2022

21 September 2022

22 September 2022

23 September 2022

24 September 2022

ISBN NUMBER: 978-9925-7552-3-3

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Registration Desk Hours:

Date	Hours:
18/9	**17.00-20.00**
19/9	**09.00-13.30, 16.00-18.00**
20/9	**08.00-14.00, 17.00-20.00**
21/9	**09.00-14.00, 16.30-18.30**
22/9	**09.00-12.30**
23/9	**09.00-11.00, 14.00-18.00**
24/9	**09.30-11.30**

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19 September 2022

09.00-11.00

Opening Ceremony
ROOM 1 – Virtual Room 1
08.50 -09.00

Room 1

Session Name:	The 17th International Symposium on Numerical Analysis of Fluid Flow, Heat and Mass Transfer Numerical Fluids 2022	No:	1
Chair Name:	Gary Rankin		
Hours	Paper Title	Author	
9:00 – 10:00	**Invited lecture** **Professor Marco Marengo** **Advanced VOF Simulations of Flow Boiling**		
10:00 – 10:20	CFD simulation of flow of basalt pebbles-water mixture in pipe	Z. Chara, V. Matousek, J. Konfrst, J. Novotny	
10:20 – 10:40	Second Order Finite Volume Scheme for Shallow Water Equations on Manifolds	Michele Giuliano Carlino and Elena Gaburro	
10:40 – 11:00	Features of Polymer Utilization for Two Phase Heat Transfer Devices	Kirill Delendik, N. Kolyago and O. Voitik	

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Room 2

Session Name:	IX Mini symposium on symmetry methods and their applications to differential equations	No:	14
Chair Name:	Maria Luz Gandarias		
Hours	Paper Title	Author	
09.00-09.30	Equivalence Transformations for a Class of Advection-Reaction-Diffusion Systems	Rita Tracina and Mariano Torrisi	
09.30-10.00	Symmetry reductions of a mathematical model of high-grade glioma based on a pair of coupled Fisher-Kolmogorov equations	M. Rosa, S. Chulian, A. Nino-Lopez, A. Martinez-Rubio M.L. Gandarias	
10.00-10.30	Non-Abelian covering and new recursion operators for the 4D Martinez Alonso-Shabat equation	Petr Vojcak	
10.30-11.00	Jets, symbolic computations on differential equations in total derivatives on diffieties	Hynek.Baran	

Room 4

Session Name:	18. Recent Advances in Numerical Methods and Simulations in Statics and Dynamics of Structure	No:	18
Chair Name:	Martin Krejsa and Jiri Kala		
Hours	Paper Title	Author	
09.00-09.20	Fragility Analysis of NPP Ventilating Chimney Under Extreme Wind Considering the Influence of NPP Buildings to Eind Impact	J. Králik	
09.20-09.40	Probabilistic Analysis of Seismic Load Considering the Local Site Effects Under NPP Buildings with the Reactor WWER 440	J. Králik	
09.40-10.00	Structural-level Modeling of CFRP Fabric Composites	E. Kormaníková	
10.00-10.20	Effect of Soil Material Models on the Prediction of Earth Embankment Deformations	E. Panulinová	
10.20-10.40	Plastic Resistance of Channel Sections under Various Internal Forces	I. Baláž	
10.40-11.00	Stability Analysis of the Frames	I. Baláž	

11.00 – 11.30	**Coffee Break**

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Room 5

Session Name:	The 7th Symposium on mathematical modeling and numerical simulation of physical and chemical phenomena in porous materials	No:	12
Chair Name:	Martin Böhm		

Hours	Paper Title	Author
09.00-09.15	Numerical modelling of a brick firing process in a tunnel kiln: Design, presumptions and limitations of a numerical model	**Jiří Maděra**, Jan Kočí
09.15-09.30	Application of fuzzy logic for prediction of thermal performances of building walls exposed to varying environmental conditions	**Jan Kočí**, Jiří Maděra
09.30-09.45	Thermoelectric Properties of Alkali-Activated Metashale Composite with Graphite Powder	Petr Hotěk, Petr Konrád, **Lukáš Fiala**
09.45-10.00	Analysis of physical and chemical aspects of using calcium aluminate cement for the preparation of low-cement heat-resistant composites	Dana Koňáková, Vojtěch Pommer, Kateřina Šádková, Eva Vejmelková, Anuj Parashar, **Václav Kočí** and Robert Černý
10.00-10.15	Effect of Sodium Hydroxide Treatment on the Microstructure and Surface Properties of Rapeseed Straw	**Miloš Jerman**, Martin Böhm, Jaroslav Dušek and Robert Černý
10.15-10.30	Improving the Tensile Shear Strength of Lap Joints of Beech Wood by Adding Basalt Fibers to Polyurethane Adhesive	**Petra Laciková**, Jan Vaněrek, Adam Běťák, Martin Böhm
10.30-10.45	Tensile Shear Strength and Microscopic Characterization of Structural Polyurethane Adhesive Modified with Basalt Fibers	**Martin Böhm**, Igor Moravčík, Petra Laciková, Jan Vaněrek, Robert Černý

11.00 – 11.30	**Coffee Break**

Room 6

Session Name:	Numerical mathematics and High Performance Computing in Engineering and Environmental Sciences	No:	37
Chair Name:	Martin Cermak		
Hours	Paper Title	Author	
09.00-09.15	Interface between Ansys and Matlab for solving of elastic contact problems	M. Čermák	
09.15-09.30	The comparison of texture roughness measures for image-based corrosion detection	L. Pospíšil	
09.30-09.45	The cross-validated calibration of Hargreaves-Samani evaporation model on Lake Most	V. Dubovský	
09.45-10.00	Control of mechanical systems motion in two dimensions: Examples of variational forces	Z. Urban	
10.00-10.15	A Concept of Adaptation of the Nelder-Mead Algorithm to Solve Optimization Problems with Feasible Sets Given by Polynomial Equality Constraints	M. Mrovec	

11.00 – 11.30	**Coffee Break**

Virtual Room 2

Session Name:	THE TWELFTH SYMPOSIUM ON ADVANCED COMPUTATION AND INFORMATION IN NATURAL AND APPLIED SCIENCES	No:	2
Chair Name:	Claus-Peter Rückemann		

Hours	Paper Title	Author
09.00-09.05	Welcome Notes	Claus-Peter Rückemann
09.05-09.50	Keynote Lecture / Information Science or The Strenuous Path of Dispensation with Hermetics: All-scientists Sustainable Contributions to Contextualisation in Prehistory and Archaeology	Claus-Peter Rückemann
09.50-10.25	The Abydos Ships Method: New-insight-driven Numeral Systems Approach for Coherent Multi-disciplinary Analysis and Contextualisation	Claus-Peter Rückemann
10.25-11.00	Secondary Use of Data – Practical and Research Data Aspects	Kalinka Kaloyanova, Zlatinka Kovacheva, Ina Naydenova

Virtual Room 3

Session Name:	Numerical Methods and Fundamental Research on Energy Conversion and Circular Economy	No:	34
Chair Name:	Prof. Dr. Abel Rouboa		

Hours	Paper Title	Author
09.00-09-40	Recent research on Energy Conversion	Abel Rouboa
09.40-10.00	Production of green hydrogen from supercritical water gasification of high-moisture biomass using Aspen Plus	Eliseu Monteiro
10.00-10.20	Production of green hydrogen from supercritical water gasification of high-moisture biomass using Aspen Plus	Eliseu Monteiro
10.20-10.40	Effect of slip velocity on hydrodynamics in a desalination membrane	Armando Soares
10.40-11.00	Blade profile aerodynamic performance of a horizontal axis wind turbine	Armando Soares
11.00-11.20	The effect of the gasifying agent in the co-gasification of coal/biomass for syngas production	Rafaela Casstro
11.20-11.40	Study of the co-gasification of the mixture of forest and organic residues: production of SYNGAS in rural areas organic residues study: syngas production in rural areas	Francisco Lazaro
11.40-12.00	Knowledge gaps and future opportunities to improve the circularity of biomass energetic recovery	Ana Ramos

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11.30-13.30

Physical Room 1 – Invited Lectures

INVITED LECTURE

Chair: Y.D.Sergeyev

Hours	Paper Title	Author
11:30-12:30	Efficient Numerical Treatment of Singular ODEs and DAEs.	Ewa B.Weinmueller

INVITED LECTURE

Chair: E.B.Weinmueller

Hours	Paper Title	Author
12:30-13:30	Numerical infinities and infinitesimals in optimization and not only	Yaroslav D.Sergeyev

Virtual Room 1

Session Name:	The 7th Symposium on mathematical modeling and numerical simulation of physical and chemical phenomena in porous materials	No:	12
Chair Name:	Martin Böhm		
Hours	Paper Title	Author	
12.00-12.15	Comparative study of the impact of basalt and steel fibers on mechanical properties of hardened concrete	Lenka Scheinherrová, Iveta Nováková, **Martin Keppert**, Robert Černý	
12.15-12.30	Subcycling Methods and their Application to Lattice Discrete Particle Models	**Jaroslav Kruis**, Jan Vorel	

Virtual Room 2

Session Name:	Numerical mathematics and High Performance Computing in Engineering and Environmental Sciences	No:	37
Chair Name:	Martin Cermak		
Hours	Paper Title	Author	
11.15-11.30	Parallel solution of parabolic partial differential equation using higher-order method	V. Šátek	
11.30-11.45	Non-linear control using the numerical method based on the Taylor series	V. Šátek	

13.30-17.00

WELCOME DRINK
13.30 - 14.30

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Room 1

Session Name:	The 17th International Symposium on Numerical Analysis of Fluid Flow, Heat and Mass Transfer Numerical Fluids 2022	No:	1
Chair Name:	Ioannis Anagnostopoulos		

Hours	Paper Title	Author
14:30 – 14:50	A Remark on the Outflow Boundary Condition in a Model of a Radial Blade Machine	Tomas Neustupa
14:50 – 15:10	High Order Finite Difference Methodology for 2D Convection-Diffusion Equation in Complex Domains	Y. Yu, R.M. Barron and R. Balachandar
15:10 – 15:30	CFD Study of Water Column Breakup Under Shock Wave Loading	Viola Rossano, Amedeo Cittadini and Giuliano De Stefano

Room 2			
Session Name:	Session 33 - Fractional Differential Calculus and Clifford Analysis	No:	33
Chair Name:	Nelson Vieira		
Hours	Paper Title	Author	
14:00-14:25	Distributed-order relaxation-oscillation equation	M.M. Rodrigues, M. Ferreira, and N. Vieira	
14:25-14:50	Dirac's method applied to the time-fractional diffusion-wave equation	M. Ferreira, N. Vieira, and M.M. Rodrigues	

Room 2			
Session Name:	General Session	No:	GS
Chair Name:	E. Paspalakis		
Hours	Paper Title	Author	
15.00-15.30	Risk Analysis in Process of Flood Risk Assessment Analysis	Maria Hlinkova and Martina Zelenakova	
15.30-16.00	Non-Markovian Dynamics in a Quantum Emitter near a Topological Insulator Nanoparticle	Emmanuel Paspalakis, Sotirios Baskoutas, David Hayrapetyan, and Ioannis Thanopulos	

Room 4

Session Name:	18. Recent Advances in Numerical Methods and Simulations in Statics and Dynamics of Structure	No:	18
Chair Name:	Juraj Králik, Jozef Melcer		

Hours	Paper Title	Author
15.00-15.20	Comparison of Numerical Model and Experiment of Tensile Test of HSS Steel for Use in Structures	M. Krejsa
15.20-15.40	Reliability Analysis of Stainless Steel CHS Columns Exposed to Flexural Buckling	D. Jindra
15.40-16.00	Design of Optimal Damper Values for a Stainless-Steel Footbridge Using Sensitivity Analysis	J. Kala
16.00-16.20	Numerical Simulation of Random Profile of the Road Surface	J. Melcer
16.20-16.40	Numerical Modelling of Moving Load Dynamic Effect on Concrete Pavements	D. Kuchárová
16.40-17.00	Determination of Material Parameters of Alkali-Activated Concrete Using Specimens with Different Types of Notches	M. Lipowczan
17.00-17.20	Numerical Simulation of the Behavior of Ball Absorber in the Spherical Dish	M. Kawulok

17.00 – 17.30	**Coffee Break**

Virtual Room 1

Session Name:	THE TWELFTH SYMPOSIUM ON ADVANCED COMPUTATION AND INFORMATION IN NATURAL AND APPLIED SCIENCES	No:	2
Chair Name:	Claus-Peter Rückemann		
Hours	Paper Title	Author	
15.00-16.55	Delegates' Summit: Best Practice and Definitions – Quality of Knowledge and Quality of Data	*Claus-Peter Rückemann, Kalinka Kaloyanova, Zlatinka Kovacheva, Ina Naydenova, Friedrich Hülsmann, Birgit Gersbeck-Schierholz, (and audience)*	
16.55-17.00	*Networking and Outlook*	*Claus-Peter Rückemann*	

Virtual Room 2

Session Name:	IX Mini symposium on symmetry methods and their applications to differential equations	No:	14
Chair Name:	Maria Luz Gandarias		
Hours	Paper Title	Author	
14.30-15.00	Lie Symmetries for aWave Equation with Frictional and Viscoelastic Damping	Almudena P. Márquez, Elena Recio, Tamara M. Garrido, and María L. Gandarias	
15.00-15.30	Lie symmetry analysis of 3-Dimensional tumour invasion model	Pauline Nitsime Basetsana	
15.30-16.00	Classical and nonclassical potential symmetries of the general time fractional third-order Korteweg-de Vries equation	Pauline Nitsime Basetsana	

Virtual Room 3

Session Name:	Session 33 - Fractional Differential Calculus and Clifford Analysis	No:	33
Chair Name:	Rolf Sören Kraußhar		
Hours	Paper Title	Author	
16:00-16:25	On Bergman Type Operators on Weighted Monogenic Bergman Spaces	K. Avetisyan, and K. Gürlebeck	
16:25-16:50	A Dynamic Derivative for Fuzzy-Valued Functions	R.S. Kraußhar, D. Legatiuk, B. Schneider, and T. Truong	
16:50-17:15	The Cauchy Transform And Kerzman-Stein Theory Revisited In The Octonionic Monogenic Setting	R.S. Kraußhar	

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17.30-21.00

Virtual Room 1 – Invited Lectures

INVITED LECTURE

Chair: L.Brugnano

Hours	Paper Title	Author
17:30-18:30	Space and time discretization in advanced numerical methods for free-surface hydrodynamics	Vincenzo Casulli

END OF DAY 1

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20 September 2022

09.00-11.00

Room 1

Session Name:	14-th Symposium on Recent Trends in the Numerical Solution of Differential Equations	No:	27
Chair Name:	**Ewa Weinmueller**		
Hours	Paper Title	Author	
09.00-09.30	A Hybrid WKB-based method for Schroedinger scattering problems in the semi-classical limit	Anton Arnold	
09.30-10.00	Solving 2D exterior soft scattering elastodynamic problems by BEM and by FEM-BEM coupling using potentials	Silvia Falletta	
10.00-10.30	Fine tuning numerical schemes for PDEs	Gianluca Frasca-Caccia	
10.30-11.00	Solving Volterra equations of the third kind by a spline collocation method	Pedro Lima	

Room 2

Session Name:	8th edition of the Symposium on Computational Tools for Direct Digital Manufacturing (CT4DDM)	No:	16
Chair Name:	Nuno Alves, Paula Pascoal-Faria and Sandra Amado		
Hours	Paper Title	Author	
09.00-09.20	Advanced and flexible 3D scanning apparatus for customized orthoses	Rui Silva, Pedro Mourouço, António Veloso and Nuno Alves	
09.25-09.45	Effect of geometrical features in biodegradable scaffolds for tissue tissue engineering: a numerical analysis	Miguel Duarte, João Meneses, Nuno Alves and Paula Pascoal-Faria	
09.45-10.15	Development of a novel computational tool for additive manufacturing to produce in sito customized implants	Miguel Belbut, Sara Biscaia, Paula Pascoal-Faria, and Nuno Alves	
10.15-10.35	Dynamic modelling of additive manufacturing process: a comparative study	Miguel Belbut, Tiago Santos, Nelson Ferreira, Nuno Alves and Paula Pascoal-Faria	

11.00 – 11.30	**Coffee Break**

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Room 3

Session Name:	Symposium of Applied Statistics to Business and Management	No:	53
Chair Name:	Helena Sofia Rodrigues and Jorge Esparteiro Garcia		
Hours	Paper Title	Author	
09.00-09.20	Sustainable Development Goal 9 in a cluster perspective: a case study for Alto Minho region	Mariana Abreu, **Helena Sofia Rodrigues**, Ângela Silva and Jorge Esparteiro Garcia	
09.20-09.40	Using Principal Component Analysis to support Content Marketing Strategies	Bruno Matos, **Jorge Esparteiro Garcia** and Florbela Correia	
09.40-10.00	Marketing and Religion - Spiritual Commitment and Church Engagement of a Portuguese Parish: a Principal Component Analysis	Jéssica Campos, Manuel José Fonseca and **Helena Sofia Rodrigues**	
10.00-10.20	Supplier Selection and Procurement: Key Criteria and Purchasing Strategies	Ana C. Ferreira, Ana C. Ribeiro, **Ângela Silva** and Bruna Ramos	

11.00 – 11.30	**Coffee Break**

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Room 4

Session Name:	The 17th International Symposium on Numerical Analysis of Fluid Flow, Heat and Mass Transfer Numerical Fluids 2022	No:	1
Chair Name:	Marco Marengo		

Hours	Paper Title	Author
9:30 – 9:50	Numerical Analysis of a Free Runner Mounted Downstream Of Francis Runners	Alin I. Bosioc, Raul Szakal, Adrian Stuparu1, Romeo Susan-Resiga
9:50 – 10:10	A fast 6-DoF tracking method for submerged bodies: application to fish passage through a turbine	Phoevos (Foivos) Koukouvini and John Anagnostopoulos
10:10 – 10:30	Simulation of horizontal hydraulic conveying and dune formation based on CFD-DEM	Nazerke Saparbayeva, Pawel Kosinski, Guillaume Dumazer, Marc Fischer, Boris V. Balakin
10:30 – 10:50	CFD Analysis of Shock/Water Column Interaction Using OpenFOAM	Maria Cristina Vitulano, Antonio Mezzacapo and Giuliano De Stefano

Room 5

Session Name:	Mathematical Optimization in Modern Medicine and Engineering	No:	54
Chair Name:	Flavius Pater		
Hours	Paper Title	Author	
09:00 – 09:30	The Study of the Textural Elements Variation in Relation to the Depth on the Soil Profile	Radu BERTICI, Cosmin Alin POPESCU, Mihai Valentin HERBEI, Daniel DICU, Florin SALA	
09:30 – 10:00	Relationships of Agrochemical Indices Interdependence in the Characterization of Some Soil Samples	Daniel DICU, Cosmin Alin POPESCU, Mihai Valentin HERBEI, Radu BERTICI, Florin SALA	
10:00 – 10:30	Uniform Stability In Mean For Stochastic Skew-Evolution Semiflows In Banach Spaces	Timea Melinda Szemely FULOP	
10:30 – 11:00	Datko Type Characterizations for Uniform Dichotomy of Linear Discrete-Time Skew-Evolution Cocycles in Banach Spaces	Ariana GAINA and Carmen Florinela POPA	

11.00 – 11.30	**Coffee Break**

Room 6			
Session Name:	The 11th Symposium on Generating Functions of Special Numbers and Polynomials and Their Applications (GFSNP2022)	No:	9
Chair Name:	Yilmaz SIMSEK		
Hours	Author	Paper Title	
08:30 – 08:50	Yilmaz SIMSEK	A Note On Certain Classes Of Finite Sums II	
08:50 – 09:10	Isabel CAÇÃO, M.I. FALCÃO, H.R. MALONEK and G. TOMAZ	Relating Certain Coefficients of Special Hyperholomorphic Polynomials with a Horadam Sequence II	
09:10 – 09:30	Mustafa Gurhan YALCIN, Sezer UNAL, Ozge Ozer ATAKOGLU, Fusun YALCIN	Statistical Evaluation of Chemical Contents of Damlatas (Alanya/ Antalya) Beach Sand II	
09:30 – 09:50			
09:50 – 10:10	Geno NIKOLOV	On the Extreme Zeros of Jacobi Polynomials	
10:10 – 10:30	Dimitar K. DIMITROV, Ivan GADJEV, Geno NIKOLOV and Rumen ULUCHEV	On the Sharp Constant in Inequalities of Hardy Type	

11.00 – 11.30	**Coffee Break**

Room 7			
Session Name:	No. **67**: Contributions on Statistical Modeling and Forecasting	No:	67
Chair Name:	A. Manuela Gonçalves		
Hours	Paper Title	Author	
09.00-09.20	Dynamic Mortality Tables for an Insurance Company in Portugal	Margarida Oliveira, A. Manuela Gonçalves, Filipe Gonçalves e Luís Maranhão	
09.20-09.40	Fitting state-space models: difficulties and challenges	Marco Costa, F. Catarina Pereira, A. Manuela Gonçalves and Magda Monteiro	
10.00-10.20	Statistical Modeling of Time Series with Outliers through the State Space Approach	F. Catarina Pereira, A. Manuela Gonçalves and Marco Costa	
10.20-10.40	Presmoothed Estimators of the State Occupation Probabilities in Multi-state Survival Data	Luís Meira-Machado and Gustavo Soutinho	

11.00 – 11.30	**Coffee Break**

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Room 8

Session Name:	52. Dynamical Systems and Their Applications to Advanced Materials, Structures and Technologies	No:	52
Chair Name:	Prof. Jiří Vala (Brno University of Technology)		

Hours	Paper Title	Author
08.30-09.00	Bounded Particular Solution of a Non-Homogeneous System of Two Discrete Equations	J. Baštinec, J. Diblík
09.00-09.30	Existence of a Bounded Solution of a Non-Homogeneous Linear Planar Discrete System	J. Diblík, M. Hartmanová
09.30-10.00	More to the Assymptotic Behaviour of Solutions to a Second-Order Emden-Fowler Difference Equations	J. Diblík, E. Korobko
10.00-10.30	General Solution of a Three-Dimensional Linear Difference System with a Delay	J. Diblík, J. Šafařík, H. Halfarová

11.00 – 11.30	**Coffee Break**

Virtual Room 1

Session Name:	Geomatics Approaches for environmental surveying and modelling	No:	44
Chair Name:	Mangiameli Michele		
Hours	Paper Title	Author	
09.00-09.20	A new regularity criterion for the 3D MHD equations in terms of the pressure in Triebel-Lizorkin spaces	Ravi P. Agarwal, Ahmad Alghamdi, Sadek Gala and **Maria Alessandra Ragusa**	
09.20-09.40	Analysis of gravimetric data continuously acquired for the monitoring of the island of Vulcano: comparison with seismic and ground deformation data	Filippo Greco, **Lucia Cavallaro**, Michele Mangiameli, Giuseppe Mussumeci	
09.40-10.00	Optimized Coverage Path Planning with a Team of Multi-rotors for Environment Reconstruction	**Dario C.Guastella**, Giuseppe Sutera, Giovanni Muscato	
10.00-10.20	The astonishing paroxysmal episode of 10 February 2021 at Mt. Etna: lava flow and pyroclastic avalanche hazard assessment through numerical modeling.	**Francesco Zuccarello**, Giuseppe Bilotta , Annalisa Cappello, Mattia de' Michieli Vitturi, Tomaso Esposti Ongaro, Gaetana Ganci	
10.20-10.40	Remote sensing approach for monitoring of macrofactors clime, soil and vegetation (ME.D.A.L.US. protocol) in the desertification process in Sicily	**Giuseppe Mussumeci,** Michele Mangiameli , Rosanna Costa ,Vincenzo Piccione, Mario Schilirò, Davide Tomarchio	
10.40-11.00	Kinematic dgps integrated with video shooting for the restitution of the centerline and the testing of the horizontal signs	**Giuseppe Mussumeci**, Michele Mangiameli	

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Virtual Room 3			
Session Name:	Experimental and numerical behaviour of steel structures under seismic, fatigue and robustness actions	No:	55
Chair Name:	Roberto Tartaglia and Paolo Todisco		

Hours	Paper Title	Author
09.00-09.20	Seismic Assessment and Upgrading of Existing NonConforming Multi-Storey Steel Buildings: A Case Study	R. Tartaglia
09.20-09.40	Preliminary study of the seismic performance of steel moment resisting frame equipped with Freedam joints	A. Poursadrollah
09.40-10.00	Proposal of Seismic Design Rules for Lightweight Steel Building in 2nd Generation of Eurocode 8	A. Prota
10.00-10.40	Seismic capacity experimental characterisation of bracing systems for ceilings trough universal testing machine	A. Prota
10.40-11.00	Orthogonal Steel Exoskeleton for Low Impact and Rapid Execution Retrofitting of Existing Buildings: State-of-the-art and Structural Concept	A. Prota
11.00-11.40	Simplified corrosion fatigue assessment of steel constructions in aggressive environments	A. Milone
11.40-12.00	An analytical model for the assessment of the tensile behavior of wire strands affected by pitting corrosion	A. Milone
12.00-12.40	Seismic Design of a Perimeter Moment Resisting Frame in DC2 Ductility Class	M. Maglio, R. Montuori, E. Nastri, V. Piluso
12.40-13.00	Seismic Design of Frame Equipped with FREEDAM Connections	M. Maglio, R. Montuori, E. Nastri, V. Piluso
13.00-13.40	Design Procedure for Dissipative Replaceable Link Frames	E. Nastri, R. Montuori, V. Piluso, A. Pisapia
13.40-14.00	Simplified Methods for the Evaluation of seismic Performances of Steel Frames: Validation through IDA	P.Todisco
14.00-14.40	Simplified Methods for the Evaluation of seismic Performances of Steel CBFs: Validation through IDA	P.Todisco

11.30-13.30

Physical Room 1 – Invited Lectures

INVITED LECTURE

Chair L.Rández

Hours	Paper Title	Author
11:30-12:30	Numerical discretisations of stochastic Hamiltonian and Poisson systems	David Cohen

INVITED LECTURE

Chair: David Cohen

Hours	Paper Title	Author
12:30-13:30	Runge-Kutta[-Nyström] methods for the numerical integration of linear inhomogeneous IVPs	Luis Rández

Virtual Room 1			
Session Name:	Symposium of Applied Statistics to Business and Management	No:	53
Chair Name:	Helena Sofia Rodrigues and Jorge Esparteiro Garcia		
Hours	Paper Title	Author	
11.20-11.40	The perception of handicapped parking: a preliminary statistical analysis	Ana Catarina Fernandes, Cátia Esteves, **Manuel Sousa Pereira** and Helena Sofia Rodrigues	
11.40-12.00	The importance of color in logos: a statistical analysis for the Facebook logo	Helena Sofia Rodrigues and **Álvaro Cairrão**	

Virtual Room 2			
Session Name:	8th edition of the Symposium on Computational Tools for Direct Digital Manufacturing (CT4DDM)	No:	16
Chair Name:	Nuno Alves, Paula Pascoal-Faria and Sandra Amado		
Hours	Paper Title	Author	
12.00-12.30	Multiscale modelling for the prediction of the mechanical properties of additively manufactured AlSi10Mg parts	Nathan March (CSIRO), Indrajeet Katti (RMIT), Dayalan Gunasegaram (CSIRO), Samuel McNeil (CSIRO)	

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13.30-17.00

Room 1

Session Name:	The 17th International Symposium on Numerical Analysis of Fluid Flow, Heat and Mass Transfer Numerical Fluids 2022	No:	1
Chair Name:	Zdenek Chara		

Hours	Paper Title	Author
15:20 – 15:40	Morton-Ordered GPU Lattice Boltzmann CFD Simulations with Application to Blood Flow	Gerald Gallagher, Fergal J. Boyle
15:40 – 16:00	Numerical Investigation of the Instability of a Supersonic Jet Impacting a Substrate	Patrick Pomerleau-Perron and Gary W. Rankin
16:00 – 16:20	A Homogeneous Equilibrium Model for the Simulation of Two Dimensional Two-Phase Flow Riemann Problem	A. Qadi El Idrissi and Dia Zeidan
16:20 – 16:40	Mass transfer modelling for compressible two-phase flows	Eric Goncalves da Silva and Yannick Hoarau

Room 2

Session Name:	7th Symposium on Modelling and Simulation in Computer Sciences and Engineering (MSCSE 2022)	No:	41
Chair Name:	Joaquim Ferreira		

Hours	Paper Title	Author
14.30-14.50	Using Time Features in RSS Fingerprinting Based Positioning Systems	Dorra Jerbi, Joaquim Ferreira and Paulo C. Bartolomeu
14.50-15.10	Indoor Radon and Energy Efficiency: A "Short Blanket" Problem that Demands for Balanced Ventilation	António Curado and Leonel J. R. Nunes
15.10-15.30	Personalized and Context-Aware Decision Support System for Diabetes Therapeutics	Débora Amorim, Carlos Abreu and Francisco Miranda
15.30-15.50	Theoretical Simulation of Solid Polymer Electrolyte Based on Poly(vinylidene fluoride) with Lithium Salts for Lithium-Ion Battery Application	Daniel Miranda, Francisco Miranda, C.M. Costa and S. Lanceros-Méndez

Room 4

Session Name:	22) Optimization and decision science: theory, numerical methods, and applications to real life	No:	22
Chair Name:	Ricardo Almeida and Natália Martins		

Hours	Author	Paper Title
14.00-14.20	Variational problems of variable fractional order involving arbitrary kernels	Ricardo Almeida
14.20-14.40	Generalized Herglotz-type variational problems involving distributed-order fractional derivatives with arbitrary smooth kernels	Natália Martins
14.40-15.00	Frational variational problem of Herglotz type involving arbitrary kernels	Dina Tavares
15.00-15.20	On the concept of generalized proportional Caputo fractional differential equations with impulses	Snezhana Hristova
15.20-15.40	Dengue Disease – Applying Personal Protective Measures with Delay	Artur M. C. Brito da Cruz, Helena Sofia Rodrigues and M. Teresa T. Monteiro
15.40-16.00	Assessing Multiple Personal Protections For Dengue: An Optimal Control Approach	Artur M. C. Brito da Cruz, Helena Sofia Rodrigues and M. Teresa T. Monteiro

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17.00 – 17.30	**Coffee Break**

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Room 5

Session Name:	Mathematical Optimization in Modern Medicine and Engineering	No:	54
Chair Name:	Flavius Pater		
Hours	Paper Title	Author	
15:00 – 15:30	Models of Variation of Some Indices in the Analysis of an Area Based on Remote Sensing	Mihai Valentin HERBEI, Cosmin Alin POPESCU, Adina HORABLAGA, Radu BERTICI, Daniel DICU, Florin SALA	
15:30 – 16:00	Piecewise Polynomial Least Squares Method for optimal control problem	Madalina Sofia PASCA, Bogdan CARUNTU, Adina JURATONI, Olivia BUNDAU and Flavius PATER	
16:00 – 16:30	Supervised and Unsupervised Classification Based on Remote Sensing for Study of an Area approximate analytic solutions	Cosmin Alin POPESCU, Adina HORABLAGA, Mihai Valentin HERBEI, Radu BERTICI, Daniel DICU, Florin SALA	
16:30 – 17:00	Interdependence Relationships between Parameters and Foliar Indices in Robinia pseudoacacia L.	Florin SALA, Cosmin Alin POPESCU, Mihai Valentin HERBEI, Radu BERTICI, Daniel DICU	

17.00 – 17.30	**Coffee Break**

Room 6

Session Name:	The 11th Symposium on Generating Functions of Special Numbers and Polynomials and Their Applications (GFSNP2022)	No:	9
Chair Name:	Yilmaz SIMSEK		

Hours	Author	Paper Title
13:40 – 14:00	Irem KUCUKOGLU	Derivation of Some Formulas for Stirling-type Numbers by p-adic Integration II
14:00 – 14:20	Neslihan KILAR	Notes on Fubini Type Numbers and Their Properties II
14:20 – 14:40	Damla GUN and Yilmaz SIMSEK	Commentaries on Relations for Apostol Type and Special Polynomials II
14:40 – 15:00	Buket ŞİMŞEK, Ayhan ŞAVKLIYILDIZ, Esra SÜZEN, Övünç POLAT, Ömer H. ÇOLAK	On the Evaluation of Statistical and Mathematical Solutions in EMG Analysis II
15:00 – 15:20	Neslihan KILAR	Remarks on Combinatorial Numbers Containing Special Numbers and Polynomials II
15:20 – 15:40	Damla GUN and Yilmaz SIMSEK	Formulas for Calculating Numerical Values of Combinatorial Sums Involving Apostol Bernoulli Numbers and Polynomials II
15:40 – 16:00	Abdelmejid BAYAD	Identities On Higher Lerch Zetas Involving Polynomial Coefficients II
16:00 – 16:20	Daeyeoul KIM and Yilmaz SIMSEK	Notes On Formulas For Apostol Type Numbers And Polynomials Derived From Partial Multiple Euler Type Zeta Function II
16:20 – 16:40	Carlos LÓPEZ	TBA
16:40 – 17:00	Sithembele NKONKOBE	TBA

Room 8

Session Name:	Numerical methods in mathematics, computer science, and education	No:	49
Chair Name:	Yaroslav D. Sergeyev		

Hours	Paper Title	Author
14.00-14.20	Approximated Iterative QLP for Change Detection in Hyperspectral Images	Antonella Falini and Francesca Mazzia
14.20-14.40	An Anisotropic Diffusion Algorithm for Image Deblurring	Lorella Fatone and Daniele Funaro
14.40-15.00	Approximations of Space-filling Curves for Numerical Applications in Robotics	Maria Chiara Nasso and Daniela Lera

17.00 – 17.30	**Coffee Break**

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Room 8

Session Name:	52. Dynamical Systems and Their Applications to Advanced Materials, Structures and Technologies	No:	52
Chair Name:	Prof. Václav Skala (University of West Bohemia in Pilsen)		

Hours	Paper Title	Author
15.30-16.00	The Energy and the Kinematic Method in Impact of Bodies Analysis	I. Němec, H. Štekbauer, M. Jedlička, D. Burkart
16.00-16.30	Interaction of Surface Constructions (2D) with the Subsoil	M. Jedlička, Z. Zajac
16.30-17.00	Algorithm for Ponding Effect Detection Considering Amount of Precipitation	Z.Zajac, M. Jedlička, R. Lang, I. Němec

17.00 – 17.30	**Coffee Break**

Virtual Room 1

Session Name:	**14-th Symposium on Recent Trends in the Numerical Solution of Differential Equations**	No:	27
Chair Name:	**Luigi Brugnano**		
Hours	Paper Title	Author	
14.00-14.30	A family of fourth order energy-preserving integrators	Yuto Miyatake	
14.30-15.00	Energetic BEM for the numerical solution of 2D elastodynamics interior problems	Alessandra Aimi	
15.00-15.30	Mean-square dissipative stochastic Runge-Kutta methods	Stefano Di Giovacchino	
15.30-16.00	Stability analysis of first order S-ROCK methods for stochastic differential equations with delays in the deterministic part	Alexey Eremin	
16.00-16.30	A Gauss-Newton continuation method for singular parameter-dependent boundary value problems using bvpsuite 2.0	Renier Mendoza	
16.30-17.00	Linearly implicit methods for stiff problems	Giovanni Pagano	

Virtual Room 2

Session Name:	Statistical Inference in Copula Models and Markov Processes VII	No:	17
Chair Name:	Verónica Andrea González-López		
Hours	Paper Title	Author	
14.00-14.20	Independence's Partition of the Set of Coordinates of a Multivariate Markov Chain	M.L. Lanfredi Viola, **J.E. García**	
14.20-14.40	Copula Analysis of the 2018 Brazilian Presidential Election	J.A.A. Schultz, **V.A. González-López**	

Virtual Room 2

Session Name:	No. **67**: Contributions on Statistical Modeling and Forecasting	No:	67
Chair Name:	A. Manuela Gonçalves		
Hours	Paper Title	Author	
15.00-15.20	Forecasting Diesel Fuel Sales – An Illustrative Comparison Between Traditional and Machine Learning Approaches Between Traditional and Machine Learning Approaches	Magda Monteiro, Diana Neves and Maria José Felício	
15.20-15.40	Time Series Clustering of Air Quality Monitoring Stations – the study case of the Beijing Municipality	Gabriel Chicale Cossa, Marco Costa and A. Manuela Gonçalves	

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Virtual Room 3

Session Name:	Numerical methods in mathematics, computer science, and education	No:	49
Chair Name:	Yaroslav D. Sergeyev		
Hours	Paper Title	Author	
16.00-16.20	A Trust-Region Method Based on Random Models and Inexact Restoration	Stefania Bellavia, Nataša Krejić, Benedetta Morini and Simone Rebegoldi	
16.20-16.40	Automatic setting of learning rate and mini-batch size in momentum and AdaM stochastic gradient methods	Giorgia Franchini and Federica Porta	
16.40-17.00	Improving the Analysis of Hybrid Systems Through the Infinity Computer	Alberto Falcone, Alfredo Garro and Yaroslav D. Sergeyev	
17.00-17.20	Using Numerical Infinities and Infinitesimals in Teaching the Infinity Concept in High Schools in Lebanon	Layla Nasr	
17.20-17.40	Efficient Estimators Using the Second Order Interval Lipschitz Condition	Mikhail Posypkin and Yaroslav D. Sergeyev	
17.40-18.00	Using Machine Learning for Separation of Parameters in High-Dimensional Global Optimization Problems	Konstantin Barkalov and Marina Usova,	
18.00-18.20	VADER-IT: a Sentiment Analysis Tool for the Italian Language	Maria Chiara Martinis, Chiara Zucco and Mario Cannataro	
18.20-18.40	On Numerical Methods for Black-Box Constrained Global Optimization	Dmitri Kvasov	

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Virtual Room 4			
Session Name:	52. Dynamical Systems and Their Applications to Advanced Materials, Structures and Technologies	No:	52
Chair Name:	Prof. Josef Diblík (Brno University of Technology)		
Hours	Paper Title	Author	
14.00-14.30	Construction of an Equation for Determining the Boundary of the Instability Region for the Pendulum Model under Uncertainty at Parametric Resonance	I. Dzallahadova, M. Růžičková	

Virtual Room 5

Session Name:	Vth Symposium on Advanced Methods and Information Technologies Applications (AMITA)	No:	21
Chair Name:	Prof. Dr. Petr S. Martyshko and Prof. Dr. Elena N. Akimova		

Hours	Paper Title	Author
14:00-14:15	On approximation gravity data with the singular functions.	Petr S. Martyshko, Denis D. Byzov, Alexey P. Cherepanov
14:15-14:30	Solving the heat transfer equations for permafrost models using graphics processors.	Elena N. Akimova, Vladimir E. Misilov
14:30-14:45	Evaluation of the models of copper spatial distribution in the surface layer of the soil based on artificial neural networks by the permutation method.	Alexander P. Sergeev, Anastasia Butorova, Andrey Shichkin, Alexander Buevich, Elena Baglaeva, Irina Subbotina, Marina Sergeeva
14:45-15:00	Stabilization coefficient assessment for local corrections method in non-linear gravity field inversion	Alexander G. Tsidaev
15:00-15:15	Analytical method of recognition and positioning of circular identification marks.	M.A. Obyazalov, Andrey V. Sosnovsky
15:15-15:30	Application of a scenario based dialog expert system for different subject areas automation.	Andrey A. Tarasiev, Margarita E. Filippova, Konstantin A. Aksyonov, Egor N. Talantsev
15:30-15:45	Increasing the distinctness of clearings and forest vegetation using vegetation indices from satellite images	Sergey M. Zraenko

17.30-21.00

Room 1

Session Name:	General Session	No:	GS
Chair Name:	Anthony Gravouil		
Hours	Paper Title	Author	
18.30-19.00			
19.00-19.30	A well-conditioned and efficient implementation of dual reciprocity method for Poisson equation this paper is already published in the journal AIMS Mathematics	Suliman Khan, M. Riaz Khan , Aisha M. Alqahtani , Hasrat Hussain Shah , Alibek Issakhov, Qayyum Shah and M. A. El-Shorbagy	
19.30-20.00	An explicit time-stepping integrator dedicated to non-smooth dynamics	Anthony Gravouil	
20.00-20.30	Chaos by labeling	Marat Akhmet	

Room 4

Session Name:	General Session	No:	GS
Chair Name:	A. Tyliszczak		
Hours	Paper Title	Author	
18.30-19.00	A Very High-Order Compact Difference Method for Wall-Bounded Flows	L. Caban, A. Tyliszczak S. Abide and J.A. Domaradzki	
19.00-19.30	LES of an axially excited non-circular blu-body flame	Agnieszka Wawrzak, Robert Kantoch and Artur Tyliszczak	
19.30-20.00	A Novel Family for Finding Multiple Roots of Nonlinear Equations with Optimal Eighth-Order Convergence	Rajni Sharma, Ashu Bahlb, and Ranjita Guglani	
20.00-20.30			
20.30-21.00			

Room 5

Session Name:	Session #43 "Numerical aspects of the Radial Basis Functions (RBFs) and applications"	No:	43
Chair Name:	Nadaniela Egidi		
Hours	Paper Title	Author	
18.30-18.50	RBFs Preconditioning via Fourier Decomposition Method	Josephin Giacomini	
19.10-19.30	Taylor Expansion for RBFs Decomposition	Nadaniela Egidi	
19.30-19.50	Numerical Simulation on 2D phase change TPL Bioheat Model Using RBF Meshfree Method	Rohit Verma, Sushil Kumar	

Room 6

Session Name:	Mathematical Optimization in Modern Medicine and Engineering	No:	54
Chair Name:	Flavius Pater		
Hours	Paper Title	Author	
18:35 – 19:05	Experimental model for the study of energy conversion and storage in compressed air. Backup power supplies	Danut TOKAR, Adriana TOKAR, Alexandra RUSEN and Catalin DRAGOTA	
19:05 – 19:35	Using the laser scanning for conservation of Cultural Heritage buildings	Paul ZDRENGHEA, Clara – Beatrice VÎLCEANU, Sorin HERBAN and Adrian ALIONESCU	

Room 8

Session Name:	52. Dynamical Systems and Their Applications to Advanced Materials, Structures and Technologies	No:	52
Chair Name:	Prof. Josef Diblík (Brno University of Technology)		
Hours	Paper Title	Author	
18.30-19.00	Differential Equations as a Projection of Implicit Functions Using Spatio-Temporal Taylor Expansion and Critical Points Properties	V. Skala	
19.00-19.30	On an Explicit Computational Scheme for the Analysis of Dynamical Behaviour of Quasi-Brittle Composite Structures	J. Vala	

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Virtual Room 1

Session Name:	The 11th Symposium on Generating Functions of Special Numbers and Polynomials and Their Applications (GFSNP2022)	No:	9
Chair Name:	Yilmaz SIMSEK		
Hours	Author	Paper Title	
18:40 – 19:00	Zekiye ÇİLOĞLU ŞAHİN	Some Results on Generalized Symmetric Bi-Jordan Derivation on Prime Rings II	
19:00 – 19:20	Erkan AGYUZ	On Convergence Properties of Fubini Type Polynomials II	
19:20 – 19:40	Erkan AGYUZ	A Note on Bernoulli and Euler Type Numbers and Polynomials II	
19:40 – 20:00	Mine MENEKSE YILMAZ	A Study on Order of Convergence of Generalized Chlodovsky-Szász Type Operators II	
20:00 – 20:20	Mine MENEKSE YILMAZ	On Voronovskaya Type Result for Generalized Jakimovski-Leviatan Operators II	
20:20 – 20:40	Hasan Muhammed AKTAS	A New Family of Arithmetic Sequence Associated with the Lucas Numbers II	
20:40 – 21:00	Rifat BATTALOGLU	Mathematical Modelling of Microwave Assisted Soxhlet Extraction of Fatty Acid Components from Prunus Laurocerasus Fruit Grown in Turkey II	
21.00-21.20	Niyazi Uğur KOÇKAL and Nazli Ipek KUL GUL	Design and Production of Composite Materials II	

Virtual Room 2

Session Name:	22) Optimization and decision science: theory, numerical methods, and applications to real life	No:	22
Chair Name:	Ricardo Almeida and Natália Martins		
Hours	Author	Paper Title	
18:40 – 19:00	Some Results on Optimal Control Problem for Perona-Malik Equation	Peter Kogut, Yaroslav Kohut and Rosanna Manzo	
19:00 – 19:20	The Many-to-Many Mapping Between the Concordance Correlation Coefficient, and the Mean Square Error	Vedhas Pandit and Björn Schuller	
19:20 – 19:40	Solving fractional Hantavirus model: A new approach	Yogita Mahatekar and Amey Deshpande	

END OF DAY 2

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21 September 2022

09.00-11.00

Room 1

Session Name:	**14-th Symposium on Recent Trends in the Numerical Solution of Differential Equations**	No:	27
Chair Name:	**Ewa Weinmueller**		
Hours	Paper Title	Author	
09.00-09.30	Periodic and subharmonic solutions of generalized Lazer-Solimi equations	Jana Burkotova	
9.30-10.00	Numerical solution of Fredholm integral equations of the second kind with discontinuous kernels	Arvet Pedas	
10.00-10.30	A dissipation preserving method to solve a fractional generalization of a nonlinear combustion equation	Nuria Reguera	
10.30-11.00	Numerical solution of linear fractional integro-differential equations	Mikk Vikerpuur	

11.00 – 11.30	**Coffeee Break**

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Room 4			
Session Name:	4st Symposium on Modelling and analysis of problems in mathematical physics and engineering	No:	31
Chair Name:	Prof. Gabriella Bognar		
Hours	Paper Title	Author	
09.00-09.20	New type of self-similar solutions of the regular diffusion equation and with possible decaying source term	Imre Ferenc Barna and László Mátyás	
09.20-09.40	Diffusion phenomena associated with surface growth	Gabriella Bognár, Imre Ferenc Barna, Krisztián Hriczó and László Mátyás	
09.40-10.00	Random noise term effect on discretized Kardar-Parisi-Zhang equation	Okhunjon Sayfidinov and Gabriella Bognár	
10.00-10.20	Numerical Analysis of Entropy Change due to Heat and Mass Transfer in Ferrofluid Flow	Krisztián Hriczó, Gabriella Bognár and Imre Barna	
10.20-10.40	Investigation of the Heat Transfer Characteristics for CuO-Oil Nanofluid in a Horizontal Pipe	Mohsen Khalili Najafabadi, Krisztián Hriczó, and Gabriella Bognár	

11.00 – 11.30	**Coffeee Break**

Room 5

Session Name:	No. **58**: Statistical Models and Applications	No:	58
Chair Name:	Luis M. Grilo		
Hours	Paper Title	Author	
09.00-09.20	Estimating the impact of the Covid 19 outbreak on Rural Tourism in Northern Portugal	Ana Borges, Ana Pedrosa, Carina Ribeiro, David Mendes, José Moura, and Tatiana Cunha Tatiana Cunha	
09.20-09.40	Stress assessment of students from a Portuguese Polytechnic. Statistical comparison by gender	Cristina Costa, Luís M. Grilo, Anuj Mubayi and Aldina Costa	
10.00-10.20	STATIS methodology: an overview	Manuela Oliveira, Eugénio Garção, Luís M. Grilo and João T. Mexia	

Session Name:	The Ninth Symposium on Approximation of Curves and Surfaces	No:	4
Chair Name:	Professor Abdalah Rababah		
Hours	Paper Title	Author	
10.30-11.00	Bernstein basis-bases generalized Jacobi type polynomials representation	M. Al Qudah	

11.00 – 11.30	**Coffeee Break**

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Room 6

Session Name:	8th Symposium on Computational Modeling and Experimental Assessment of Transport Processes in Porous Building Materials (symp. No 7)	No:	7
Chair Name:	prof. Oldřich Zmeškal, prof. Zbyšek Pavlík		

Hours	Paper Title	Author
09.00-09.20	Thermal Properties of MOC Composites with Polymer Shell Encapsulated Phase Change Material "Micronal"	Oldřich Zmeškal, Tereza Lapčíková, Lucie Maráčková, Milena Pavlikova, Zbysek Pavlík
09.20-09.40	Effect of Nanoadditive Dispersing Method on Properties of Natural Hydraulic Lime-Based Mortar	Adam Pivák, Martina Záleská, Milena Pavlíková, Zbyšek Pavlík
09:40-10:00	Hygroscopic Behavior of Zeolite Lightened Mortars Contaminated with Na2SO4	Milena Pavlíková, Martina Záleská, Zbyšek Pavlík
10:00-10:20	Assessment of Chloride Binding Isotherms of the Modified Lime Mortars	Milena Pavlíková, Zbyšek Pavlík
10:20-10:40	MOC-Based Composites with 1D and 2D Carbon Nanomaterials Stabilized by Tannic Acid	Anna-Marie Lauermannová, Julie Slámová, Ondřej Jankovský, Zbyšek Pavlík, Martina Záleská, Adam Pivák
10:40-11:00	Measurement and Analysis of Salt Transport in Building Materials Fully Saturated by Water	Milena Pavlíková, Adam Pivák, Zbyšek Pavlík

11.00 – 11.30	**Coffeee Break**

Virtual Room 1

Session Name:	Application of Artificial Intelligence tools in engineering design	No:	28
Chair Name:	Prof. David Bassir and Prof. Jüri Majak		
Hours	Paper Title	Author	
09.00-09.20	Influence of structural damping on impulse response of sandwich plates with FG-porous graphene reinforced core	Mohammed Shakir, Mohammad Talha and David Bassir	
09.20-09.40	Stochastic Buckling Analysis of Functionally Graded Porous Beams Reinforced with Graphene Platelets	Fahed Mohd, Mohammad Talha and David Bassir	
09.40-10.00	Composite characterization using DIC approach for stress – strain prediction	David Bassir, Sofiane Guessasma, Yu zheng, Yushen Cai, Patrice Salzenstein	
10.00-10.20	Application of the Adaptive Higher Order Haar Wavelet based methods for solving the Korteweg – de Vries equation	Mart Ratas and Andrus Salupere	
10.20-10.40	Comparing two wavelet approaches for solving fractional differential equations	Jüri Majak, Ernst Tungel, Lennart Kivistik and Martin Eerme	
10.40-11.00	Dynamics of Axially Graded Nanobeams with Follower Force Effect	Mustafa Arda, Marmar Mehrparvar and Kristo Karjust	

Virtual Room 2

Session Name:	The Ninth Symposium on Approximation of Curves and Surfaces	No:	4
Chair Name:	Professor Abdalah Rababah		
Hours	Paper Title	Author	
09.00-09.20	Inclinations changes caused by a discontinuous linear deformation of mining terrain	J. Orwat	
09.20-09.40	Curvatures changes caused by a discontinuous linear deformation of mining terrain	J. Orwat	

Virtual Room 2

Session Name:	Seventh Symposium on Statistical Inference in Linear Models I	No:	50
Chair Name:	Francisco Carvalho		
Hours	Paper Title	Author	
11.00-11.20	Prime basis factorials, systhematic sampling and hypercubes	Carla Francisco	
11.20-11.40	ANOVA like analysis for year, sex and country in age of death for seniors with cancer	Aníbal Areia	

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Virtual Room 3

Session Name:	Symposium on New Results in Fractional Calculus 2022	No:	20
Chair Name:	Guo-Cheng Wu, Babak Shiri, Cheng Luo		
Hours	Paper Title	Author	
09.00-09.20	Terminal value problems of generalized fractional differential equations	Babak Shiri	
09.20-09.40	Physical meaning of the general fractional calculus	Hui Fu, Guo-Cheng Wu	
10.00-10.20	Function space of the general fractional integral	Qin Fan, Guo-Cheng Wu	
10.20-10.40	Data-driven fractional uncertian differential equations	Cheng Luo, Guo-Cheng Wu	
10.40-11.00	Multi-layer neural network method for fractional differential equations	Jia-Li Wei, Guo-Cheng Wu	
11.00-11.20	Hadamard fractional calculus on time scales	Ting-Ting Song, Guo-Cheng Wu	

Virtual Room 4

Session Name:	The 17th International Symposium on Numerical Analysis of Fluid Flow, Heat and Mass Transfer Numerical Fluids 2022	No:	1
Chair Name:	Tomas Neustupa		
Hours	Paper Title	Author	
9:30 – 9:50	Effect of an anisotropy of shell coating microbubbles on ultrasound propagation in microbubbly liquids	Ryoki Kawahata and Tetsuya Kanagawa	
9:50 – 10:10	Computational Aspects of Model Formulations in Two-Phase Flow	Lukas van Gemmeren, Peer Ueberholz, Dia Zeidan	
10:10 – 10:30	Boundary Condition at Infinity for DSMC Method	Kiril S. Shterev	

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11.30-13.30

Physical Room 1 – Invited Lectures

INVITED LECTURE

Chair F. Mazzia

Hours	Paper Title	Author
11:30-12:30	Right and wrong demography evolution in epidemic mathematical models	Juan I. Montijano

INVITED LECTURE

Chair: J.I.Montijano

Hours	Paper Title	Author
12:30-13:30	Dense Output & Mesh Selection for Boundary Value Problems	Francesca Mazzia

13.30-17.00

Room 1			
Session Name:	The 17th International Symposium on Numerical Analysis of Fluid Flow, Heat and Mass Transfer Numerical Fluids 2022	No:	1
Chair Name:	Kirill Delendik		

Hours	Paper Title	Author
13:30 – 13:50	Simulation-based Study of the Impact of Mean Powder Particle Diameters on Key-Performance-Attributes of the Powder Coating of U-Profiles	Gernot Kurt Boiger, and Bercan Siyahhan
13:50 – 14:10	Thermal Performance of Gravity Independent Thin-wall Heat Pipes	Kirill Delendik, N. Kolyago and O. Voitik
14:10 – 14:30	Thermally-Controlled Generation of Uniform Droplets in an Axisymmetric Co-Flow-Focusing Device	Sarvin Naji, Giordana Peregrino, Vahid Bazargan, Marco Marengo
14:30 – 14:50	CFD Analysis on the Impact of Biogas Generation and Bubble Size on the Hydrodynamics of a UASB Reactor	Camila D' Bastiani, Jéferson Luis Alba, Severino Rodrigues de Farias Neto, Lademir Luiz Bea, David Kennedy, Anthony Reynolds

Room 2

Session Name:	Statistics and Modelling	No:	10
Chair Name:	Lubos Strelec		
Hours	Paper Title	Author	
16.00-16.20	On the Appropriate Thresholds in the Logistic Regression Bankruptcy Model	Lubos Strelec and Michaela Staňková (presenting Lubos Strelec)	
16.20-16.40	A Micro-level Perspective of Efficiency Evaluation: the Case of V4-country Timber Companies	Michaela Staňková	
16.40-17.00	New family of generalized distributions	Maalee Al Mheidat and Mohammad Alqudah (presenting Maalee Al Mheidat)	

Room 4

Session Name:	Seventh Symposium on Statistical Inference in Linear Models I	No:	50
Chair Name:	Francisco Carvalho		
Hours	Paper Title	Author	
14.30-14.50	A Goodness of fit tests, standardization and chi-square	Francisco Carvalho	
14.50-15.10	A Statistical Viewpoint Regarding the Long-term Internal Relationships Within the Fire Weather Index (FWI) for Portugal	Cristina Andrade	

Room 4

Session Name:	Symposium on Difference & Differential Equations and Applications 2022	No:	23
Chair Name:	Jozef Dzurina		
Hours	Paper Title	Author	
15.30 - 16.00	Stochastic Equation KdV: Solitons and Other Solutions	Vladislav D. Merzlyakov and Liudmila A. Uvarova	
16.00 - 16.30	Exponential solutions in a differential equation of mixed type	Sandra Pinelas	
16.30 - 17.00	Remarks on modeling of neural networks	Felix Sadyrbaev	
Chair Name:	Jozef Dzurina		
17.00 - 17.30	Properties of odd order linear functional differential equations with advanced arguments	Jozef Dzurina	
17.30 - 18.00	Kneser-type oscillation criteria for second-order delay differential equations with several neutral terms	Irena Jadlovská	
18.00 - 18.30	Lie symmetry methods for the computation of fundamental solutions of linear parabolic systems of PDES	Alba Santin Garcia	

Room 5			
Session Name:	General Session	No:	GS
Chair Name:	Farhad Nikfarjam		
Hours	Paper Title	Author	
13.30-14.00	Uniform Stability In Mean For Stochastic Skew-Evolution Semiflows In Banach Spaces	Timea Melinda Szemely FULOP	
14.00-14.30	Absolute/convective instability threshold in inverted falling film through linear stability analysis	Fabio Pino, Benoit Scheid, and Miguel Alfonso Mendez	
14.30-15.00	On Seismic Vulnerability Assessment by Means of Limit Analysis of Frames with Progressive Damage	Annalisa Greco , Francesco Cannizzaro , Ilaria Fiore and Alessandro Pluchino	
15.00-15.30	Preconditioning hyperbolic 5-equation two-phase model in intermittent pipe flow simulations	Farhad Nikfarjam, Hamid reza Anbarlooei, and Daniel O. A. Cruz	
15.30-16.00	Evaluation of the Digital Capabilities of Energy Companies	Burak Berkay Havle and Mehtap Dursun	
16.00-16.30			
16.30-17.00			

Room 6

Session Name:	General Session	No:	GS
Chair Name:			

Hours	Paper Title	Author
14.00-14.30	Nearly μH-Lindelofness	Ahmad badarneh, Zuhier Altawallbeh, Ibrahim Jawarneh and Emad Az-Zo'bi
14.30-15.00	Towards an improved mathematical model for HDV-HBV interaction	Adquate Mhlanga , Rami Zakh, Alexander Churkin, Vladimir Reinharz Harel Dahari and Danny Barash
15.00-15.30	Operator Techniques for the Construction of Solutions to Fractional Differential Equations	Tadas Telksnys
15.30-16.00	Stabilization of Unstable Orbits in Discrete and Continuous Fractional Order Dynamical Systems	Inga Telksniene
16.00-16.30	Some comments on the nonlinear Gao beam model	Jitka Machalova and Horymır Netuka
16.30-17.00	Berger Nonlinear Elastic Static Plate	Radek Svacina and Jitka Machalova

17.00 – 17.30	**Coffee Break**

Virtual Room 1

Session Name:	No. **58**: Statistical Models and Applications	No:	58
Chair Name:	Luis M. Grilo		
Hours	Paper Title	Author	
14.00-14.20	Individualized monitoring and forecasting of water consumption: a preliminary study consumption: a preliminary study consumption: a preliminary study	Eliana Costa e Silva and Flora Ferreira	
14.20-14.40	Estimation of the conditional transition probabilities given repeated measures in Multi-state models combining Joint Modeling analysis of longitudinal and survival data	Gustavo Soutinho and Luís Meira-Machado	
15.00-15.20	Statistical evaluation of laying hens' farm conditions on eggs quality	Henrique Pinho, Luís M. Grilo, Valentim Nunes and Sonya Basílio	
15.20-15.40	An innovative approach to estimate infection by COVID-19	Manuela Oliveira, Eugénio Garção, Luís M. Grilo, Armando Alexandre and João T. Mexia	

Virtual Room 2

Session Name:	Symposium on Difference & Differential Equations and Applications 2022	No:	23
Chair Name:	Jozef Dzurina		
Hours	Paper Title	Author	
15.30 - 16.00	Stochastic Equation KdV: Solitons and Other Solutions	Vladislav D. Merzlyakov and Liudmila A. Uvarova	
16.00 - 16.30	Exponential solutions in a differential equation of mixed type	Sandra Pinelas	
16.30 - 17.00	Remarks on modeling of neural networks	Felix Sadyrbaev	
Chair Name:	Jozef Dzurina		
17.00 - 17.30	Properties of odd order linear functional differential equations with advanced arguments	Jozef Dzurina	
17.30 - 18.00	Kneser-type oscillation criteria for second-order delay differential equations with several neutral terms	Irena Jadlovská	
18.00 - 18.30	Lie symmetry methods for the computation of fundamental solutions of linear parabolic systems of PDES	Alba Santin Garcia	

Virtual Room 3

Session Name:	Session #43 "Numerical aspects of the Radial Basis Functions (RBFs) and applications"	No:	43
Chair Name:	Josephin Giacomini		
Hours	Paper Title	Author	
15.00-15.20	An Adaptive RBF-PUM Algorithm for Meshfree Interpolation	Roberto Cavoretto, Alessandra De Rossi, Mohsen Esmaeilbeigi	
15.20-15.40	Spherical approximation of positive data by radial kernels	Alessandra De Rossi	
15.40-16.00	Approximating Swimming Trajectories with Radial Basis Functions	Giulia De Santis, Nicola Giulietti, Alessia Caputo, Paolo Castellini,Pierluigi Maponi	
16.00-16.20	RBFs Collocation Method for an Advection-Diffusion-Reaction Problem	Alessia Perticarini	
16.20-16.40	Non-oscillatory Solutions of the 2D Coupled Burgers' Equations Using the RTH RBF Method	Maryam Mohammadi, Mohammad Heidari, Stefano De Marchi	

Virtual Room 4

Session Name:	General Session	No:	GS
Chair Name:	Ottavia Corbi		
Hours	Paper Title	Author	
15.00-15.30	Asymptotics of Special Function Solutions of	Diego Ruiz-Antolın	
15.30-16.00	An approach to modeling of 3D masonry structures for dynamic analyses, refurbishment and control of vibrations	Ileana Corbi , Ottavia Corbi , Francesca Tropeano	
16.00-16.30	An approach to dynamic control design for 3D masonry structures	Ileana Corbi , Ottavia Corbi , Francesca Tropeano	
16.30-17.00	An algorithm for the inversion of a generalization of the regularized incomplete beta function	Amparo Gil	

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17.30-21.00

Room 4

Session Name:	Eighth Symposium on Mathematical Modelling of Hydrological Sciences	No:	65
Chair Name:	Prof. Dr. Fabio Russo		
Hours	Paper Title	Author	
18.30-18.35	Preface of the "Eighth Symposium on Mathematical Modelling of Hydrological Sciences"	**F. Russo,** E. Ridolfi, F. Napolitano	
18.35-18.50	A preliminary analysis on data accuracy for IoT rainfall measurements	B. Moccia, L. Buonora, **F.Napolitano**	
18.50-19.05	Intensity-duration-frequency curves estimation from weather radar: a review	S. Lanciotti, **F.Napolitano**	
19.05-19.20	Testing different KE-I relationships for the assessment of soil erosion risk in Amato (Italy)	L.Buonora, M. Lucantonio, C. Bertini, S.Lanciotti, **F. Russo**	
19.20-19.35	Assessment of erosivity factor: a comparative analysis	L.Soncin, **E.Ridolfi**, S.Magnaldi	
19.35-19.50	A Review On Return Period And Hazard In Hydrology	F.Napolitano, **D.L. De Luca**, D. Biondi	

Virtual Room 1

Session Name:	Stochastic Simulation for the Assessment and Mitigation of Risk	No:	11
Chair Name:	David Fernando Muñoz		
Hours	Paper Title	Author	
17.00-17.20	Simulation and Value Stream Map Generated Using Real-time Location System	Elias Arias Nava, Brendan P. Sullivan	
17.20-17.40	Solving the Guaranteed Service-time Inventory Model using Commercial Solvers	Luis Moncayo-Martínez	
17.40-18.00	A C++ Library for Fast Simulation of Queues and Some Experimental Results	David Fernando Muñoz	

Virtual Room 1

Session Name:	Statistics and Modelling	No:	10
Chair Name:	TBA		
Hours	Paper Title	Author	
18.00-18.30	Advanced Stochastic Lattice Methods for Multidimensional Sensitivity Analysis	Venelin Todorov, Ivan Dimov, Karl Sabelfeld	
18.30-19.00	Statistical computation of a superposition of infinitely many Ornstein–Uhlenbeck processes	Hidekazu Yoshioka, Tomohiro Tanaka, Yumi Yoshioka, and Ayumi Hashiguchi	
19.00-19.30	New family of generalized distributions	Maalee Almheidat	

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Virtual Room 2

Session Name:	Eighth Symposium on Mathematical Modelling of Hydrological Sciences	No:	65
Chair Name:	Prof. Dr. Francesco Napolitano - Prof. Dr. Elena Ridolfi		

Hours	Paper Title	Author
18.30-18.35	Preface of the "Eighth Symposium on Mathematical Modelling of Hydrological Sciences"	**F. Russo,** E. Ridolfi, F. Napolitano
18.35-18.50	A preliminary analysis on data accuracy for IoT rainfall measurements	B. Moccia, L. Buonora, **F.Napolitano**
18.50-19.05	Intensity-duration-frequency curves estimation from weather radar: a review	S. Lanciotti, **F.Napolitano**
19.05-19.20	Testing different KE-I relationships for the assessment of soil erosion risk in Amato (Italy)	L.Buonora, M. Lucantonio, C. Bertini, S.Lanciotti, **F. Russo**
19.20-19.35	Assessment of erosivity factor: a comparative analysis	L.Soncin, **E.Ridolfi**, S.Magnaldi
19.35-19.50	A Review On Return Period And Hazard In Hydrology	F.Napolitano, **D.L. De Luca**, D. Biondi

END OF DAY 3

22 September 2022

Physical Room 1 – Invited Lectures

INVITED LECTURE
Chair L.Brugnano

Hours	Paper Title	Author
09:00-10:00	Parameter estimation and uncertainty quantification using Information Geometry: an overview	Kevin Burrage

HONORARY SPEAKER
Chair K.Burrage

Hours	Paper Title	Author
10:00-11:00	Line Integral Methods: an ICNAAM story, and beyond	Luigi Brugnano

INVITED LECTURE
Chair L.Brugnano

Hours	Paper Title	Author
11:00-12:00	On the use of entropy in least squares approximation	Felice Iavernaro

Group Photo

12.15

INVITED LECTURE
Chair Ewa Weinmuller

Hours	Paper Title	Author
17:00-18:00	Bibliometric indexes and the need to evaluate research papers and authors	Pierluigi Amodio

Please note that the program is updated regularly.

- Always download the updated version of the program from **HERE** -

Virtual Room 1

Session Name:	Applied Problems in Probability Theory and Mathematical Statistics Related to Modeling of Information Systems (APPT+MS)	No:	6
Chair Name:	Alexander Zeifman		

Hours	Paper Title	Author
09.00-09.20	Bounds on the rate of convergence for a modified Prendiville model	**I.Usov**, Y.Satin and A.Zeifman
09.20-09.40	Ergodicity Bounds for One~Nonstationary Markovian Model with Impatience	**A. Zeifman**, R. Razumchik, Y. Satin, I. Kovalev, I. Usov, G. Shilova, A. Kryukova

Virtual Room 1

Session Name:	**Mathematical Modeling, Numerical Algorithms, Optimization Methods and Flow Control for Aerospace Techniques**	No:	45
Chair Name:	Alexandru DUMITRACHE, Daniel-Eugen CRUNTEANU		

Hours	Paper Title	Author
11.00-11.20	*Analysis of Pulse Detonation Engine Based on Numerical Simulations for Hypersonic Velocities.*	Vasile Prisacariu, Irina-Carmen Andrei, Mihai-Leonida Niculescu, Mihai-Victor Pricop
11.20-11.40	*Structural Analysis of Crack Damaged Aircraft Part and Consequent Influences on Adaptive Maintenance Planning*	Iulia-Mădălina DUMITRU, Irina-Carmen ANDREI
11.40-12.00	*The importance of Meteorological Phenomenon's in Flight Control System* *The importance of Meteorological Phenomenon's in Flight Control System*	Gabriela-Liliana STROE, Daniel-Eugen CRUNTEANU, Emil COSTEA, Mihaela-Luminita COSTEA
12.00-12.20	*Study of Integration of Meteorological Information in Dynamic of Flight*	Gabriela-Liliana STROE, Daniel-Eugen CRUNTEANU, Emil COSTEA, Mihaela-Luminita COSTEA
12.20-12.40	*Meteorological Service for International Air Navigation*	Gabriela-Liliana STROE, Daniel-Eugen CRUNTEANU, Emil COSTEA, Mihaela-Luminita COSTEA
12.40-13.00	*Adjoint building design optimization coupled with a VAWT for wind energy harvesting through a sea coastal wind stream*	Cosmin Katona, Carmen Anca Safta, Alexandru Dumitrache

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Virtual Room 2			
Session Name:	General Session	No:	GS
Chair Name:	Javier Segura Sala		
Hours	Paper Title	Author	
09.30-10.00	Weakly(Nearly) μH-Countably Compactness	Zuhier Altawallbeh, Ahmad badarneh, Ibrahim Jawarneh and Emad Az-Zobi	
10.00-10.30	Best algebraic bounds for ratios of modified Bessel functions	Javier Segura Sala	

Virtual Room 2			
Session Name:	Symposium on Computational Modelling and Interactive Environments in Science, Technology, Engineering and Mathematics Education	No:	47
Chair Name:	Rui Gomes Neves		
Hours	Paper Title	Author	
11.00-11.10	Preface of the Symposium on Computational Modelling and Interactive Environments in Science, Technology, Engineering and Mathematics Education	Rui Gomes Neves	
11.10-11.30	Exploring Light Polarization with Interactive Computational Modelling	Rui Gomes Neves	
11.30-11.50	Teaching the Rate-and-State Friction Law using Interactive Computational Modelling	Maria C. Neves and Rui Gomes Neves	
11.50-12.10	Interactive Guided Training in Higher Mathematics courses with Halomda platform	Mariana Durcheva and Philip Slobodsky	
12.10-12.30	Trusted e-Assessment in High Math courses based on the Halomda platform	Philip Slobodsky and Maria Durcheva	

Virtual Room 3

Session Name:	Symposium on Advanced Systems Analysis and Information Systems Development	No:	70
Chair Name:	Prof. Dr. Alexander M. Tarasyev, Assoc. Prof. Dr. Alexander A. Tarasyev		

Hours	Paper Title	Author
09.00-09.20	Sensitivity Analysis for Economic Growth Model by Elasticity of CES Production Function	Tarasyev A.M., Usova A.A., Tarasyev A.A.
09.20-09.40	Optimal Control Strategies and Trajectories of Replicator Dynamics	Krasovskii N.A., Tarasyev A.M.
9.40-10.00	Modeling of construction of railway transportation routes based on the criteria of cost and terms of transportation	Agarkov G.A., Tarasyev A.A.
10.00-10.20	Modeling and assessment of the influence of economic and behavioral factors on the choice of educational trajectories by students	Tarasyeva T.V., Tarasyev A.A., Agarkov G.A.
10.20-10.40	Modeling the impact of an economically optimal choice of educational trajectory on labor market tensions	Tarasyeva T.V.
10.40-11.00	Modification of the model assessment of the migration attractiveness of regional labor markets	Agarkov G.A., Karavaev V.S., Vishnyakova A.Y.
11.00-11.20	Dynamic modeling of regional labor migration in terms of increase of labor market tightness	Tarasyeva T.V., Khandrik J.A., Sycheva A.A.
11.20-11.40	Professional mobility as a consequence of the digital transformation of the labor market	Tarasyev A.A., Tarasyeva T.V., Khandrik J.A.
11.40-12.00	Evolutionary Models of Dynamic Systems for IT Project Management	Timokhin V.N., Kolomytseva A.O., Tarasyev A.M., Turygina V.F.
12.00-12.20	FEM-based Computer Simulation Training To Study synergistic effects	Sachkov I.N., Turygina V.F., Ford V., Matkovskaya A.
12.20-12.40	Toxic Advice: Why Software Engineers Are So Cranky. Case for IT education	Turygina V.F., Ford V., Kozlova A.
12.40-13.00	A Comparative Study on COVID-19 Wave Behavior: The Case of Two Counties	Vasilev J., Agbozo E., Turygina V.F.

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Virtual Room 4

Session Name:	Interdisciplinary Problems of Clean Energy from Waste	No:	36
Chair Name:	Vladislav N. Kovalnogov		
Hours	Paper Title	Author	
09.00-09.20	Mathematical Modeling of Ways to Improve the Efficiency of Fuel Combustion in Combustion Devices	Vladislav N. Kovalnogov, Ruslan V. Fedorov, Sergey V. Bysigin, Dmitry A. Generalov	
09.20-09.40	Binary Classification Aggregation Approaches to Technical Diagnostics with Application of Machine Learning	I.N. Karpunina, V.N. Klyachkin, V.N.Kovalnogov, M.I. Kornilova, A.A. Santalov	
09.40-10.00	Mathematical Modeling of the Fuel Combustion Process	Vladislav N. Kovalnogov, Ruslan V. Fedorov, Yuri A. Khakhalev, Maria I. Kornilova, Larisa V. Khakhaleva, Ekaterina V. Tsvetova	
10.00-10.20	Application of fuzzy logic for the problems of effective control of wind turbines	Vladislav N. Kovalnogov, Ruslan V. Fedorov, Larisa V. Khakhaleva, Andrei V. Chukalin, Maria I. Kornilova	
10.20-10.40	Material and thermal balance of combustion of solid, liquid and gaseous substance	Alexey V. Abramov, Maria A. Maleshina	
10.40-11.00	Modelling of solid's combustion mechanism	Dmitry A. Generalov, Yury E. Chamchiyan	
11.00-11.20	Effective methods of managing the processes of heat exchange and mass transfer	Larisa V. Khakhaleva, Denis A. Demidov	
11.20-11.40	Modelling of municipal solid waste combustion	Sergey V. Busygin, Tamarv V. Karpukhina	
11.40-12.00	Mechanism of nitrogen oxides formation during combustion	Konstantin E. Karpukhin, Alexey V. Abramov	
12.00-12.20	Modelling of combined method of waste combustion	Andrey V. Chukalin, Jakhongir A. Tairov	
12.20-12.40	Dynamic similarity principles of hot stream	Maria I. Kornilova	
12.40-13.00	Simulation process of waste combustion mechanism	Tamara V. Karpukhina, Denis A. Demidov	
13.00-13.20	Energy use from waste recycling in building microclimate systems	Yury E. Chamchiyan, Jakhongir A. Tairov	

Virtual Room 4

Session Name:	The 17th International Symposium on Numerical Analysis of Fluid Flow, Heat and Mass Transfer Numerical Fluids 2022	No:	1
Chair Name:	TBA		

Hours	Paper Title	Author
13:40 – 14:00	Weakly Nonlinear Interaction of Long and Short Waves in Bubbly Liquids	Katsunori Tanaka and Tetsuya Kanagawa
14:00 – 14:20	The impact of inclined magnetic field on non-Newtonian fluid flow over a porous medium	T. Maranna, U. S. Mahabaleshwa, Dia Zeidan
14:20 – 14:40	Influence of wind shear on far-field sound propagation from wind turbine	Neeraj Paul Manelil, Jan Knoblauch, Leo Honing, Johannes Nicolaas Theron and Bernhard Stoevesandt
14:40 – 15:00	A formulation of relativistic two-phase flow	Rhameez Sheldon Herbst

Virtual Room 1			
Session Name:	Advanced model-reduction methods for fluid-structure interaction problems	No:	24
Chair Name:	Elisabeth Lacazedieu		
Hours	Paper Title	Author	
16.00-16.30	Smoothed Travelling Wave 'STW' morphing actuation with Hi-Fi numerical simulation and Machine Learning for flow dynamics predictions	**Yannick Hoarau**	
16.30-17.00	The principle of solving a mixed boundary value problem from linear elasticity with the help of Adaptive Cross Approximation for the construction of Hierarchical matrices	Christina Schwarz	
17.00-17.30	A data-driven approach for the real-time modelling of spot-welded patches under impact using Deep Learning	Afsal Pulikkathodi	
17.30-18.00	An overview of surrogate reduced-order modeling for flutter	Elisabeth Lacazedieu	

Virtual Room 2			
Session Name:	Existing structures in earthquake prone areas: Advanced strategies for the assessment, protection and refurbishment of the masonry built stock	No:	71
Chair Name:	F. CLEMENTI, A. FORMISANO, G. Milani		
Hours	Paper Title	Author	
15.30-15.45	Influence of aspect ratio and shape factor on fiber reinforced elastomeric isolators in bonded, unbonded and partially-bonded application	G. Pianese, H. Toopchi-Nezhad, G. Milani	
15.45-16.00	The non-smooth tale of Accumoli civic tower	M. Schiavoni, E. Giordano, F. Clementi	
16.00-16.15	Development of a computational limit analysis-based tool for seismic vulnerability assessment in historical masonry buildings	P. Wang, G. Milani	
16.15-16.30	Investigation of Advanced Seismic Isolator Coupled with S-shaped Steel Dampers	K. Guo, G. Milani	
16.30-16.45	Lightweight metal exoskeletons for seismic-energy retrofit of existing masonry buildings: a case study	A. Davino, E. Meglio, G. Longobardi, A. Formisano	
16.45-17.00	Non-linear analytical model for FRCM coupon in tension	Y. Yuan, G. Milani	
17.00-17.15	Simple associated and non-associated heterogeneous limit analyses for reinforced masonry arches	Y. Hua, G. Milani	

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Central Excursion

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CENTRAL DINNER

20.00 – 00.00

- **Introduction by Prof. Dr. T. E. Simos**
- **Honoring Prof. Dr. Luigi Brugnano for his career on Numerical Analysis and Applied Mathematics and his 60th birthday. Introduction by Professor Dr. Felice Iavernaro**
- **Presentation of the Honorary Fellowship Awards of the European Society of Computational Methods in Sciences, and Engineering**
- **Dinner**

END OF DAY 4

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23 September 2022

09.00-11.00

Room 4

Session Name:	Recent Trends in Inverse Problems in Imaging – Reconstruction, Regularization and Modalities	No:	57
Chair Name:	Andreas Weinmann		
Hours	Paper Title	Author	
09:00 - 09:30	A flexible Model-Based Regularized Reconstruction Approach for Magnetic Particle Imaging	Thomas März	
09:30 - 10:00	Quality-Enhancing Techniques for a two-stage Model-Based Approach for Magnetic Particle Imaging	Vladyslav Gapyak	
10:00 - 10:30	Algebraic reconstructions in MPI using realistic magnetic field topologies	Jürgen Frikel	

11.00 – 11.30	**Coffee Break**

Room 5 – Virtual Room 5

Session Name:	Modelling Progress in Aerospace Science MPAS-2022	No:	35
Chair Name:	C. Orlando, A. Ferrero, A. Esposito, S. Valvano		
Hours	Paper Title	Author	
09.00-09.15	Propeller Simulation by the Actuator Line Method in a Discontinuous Galerkin Framework	A. Ferrero, F. Larocca, L. Pagella, D. Pastrone	
09.15-09.30	ANN-based Chemical Model for Hybrid Rocket Engines	F. Masseni	
09.30-09.45	Effort Assessment During Tasks with Unmanned Aircraft Systems based on Heart Rate Variability	P. Buono, A. Esposito	
09.45-10.00	A Velocity Based Simple Adaptive Autoland System	A. Esposito, C. Orlando	
10.00-10.15	Model Updating of Structures from Shaking Table Tests by Using Continuous Particle Swarm Optimization	G. Navarra, A. Ricciardello, F. Lo Iacono	
10.15-10.30	High-order DG Method for an Implicit LES of a Gas Turbine Cascade	M. Errante, A. Ferrero, F. Larocca	
10.30-10.45	Analysis of Rocket Propulsion on Mars Exploiting In Situ Resources	E. Barca, A. Ferrero, F. Masseni, D. Pastrone	

Room 6

Session Name:	General Session	No:	GS
Chair Name:	Dmytro Svyetlichnyy		
Hours	Paper Title	Author	
09.00-09.30	The Powder Deposition Model on the Platform for Selective Laser Melting Modeling	Dmytro Svyetlichnyy	
09.30-10.00	The Visualization of Microcracks in Aged Cement Mortar Using Tomography	Radek Ševčík , Irena Adámková, Michal Vopálenský and Alberto Viani	
10.00-10.30	Accelerating Sparse Tensor-Times-Matrix-Chains with All-Accumulation	Wouter Baert and Nick Vannieuwenhoven	
10.30-11.00	Poisson stability in SICNNs	Marat Akhmet, Madina Tleubergenova and Akylbek Zhamanshin	

11.00 – 11.30	**Coffee Break**

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Virtual Room 1

Session Name:	General Session	No:	GS
Chair Name:	Shanshan Wang		
Hours	Paper Title	Author	
09.00-09.30	Split-step Quintic B-spline Collocation Methods for Parabolic Equations with Variable Coefficients in Two Dimensions	Shanshan Wang	
09.30-10.00	Kernel Neural Operator for Efficient Solving PDEs	Bao Kaijun, Qian Xu, Liu Ziyuan, Wang Haifeng and Song Songhe	
10.00-10.30	Magnus Methods for Stochastic Delay-Differential Equations	Mitchell Griggs, Kevin Burrage and Pamela Burrage	
10.30-11.00	MODE: A Modern ODE Solver for C++ and CUDA	Ali Can Demiralp, Marcel Kruger and Tim Gerrits	
11.00-11.30	Nearly MH-Lindelofness	Ahmad Badarneh, Zuhier Altawallbeh, Ibrahim Jawarneh and Emad Az-Zo'bi	

Virtual Room 2

Session Name:	The 7th Symposium on Optimal Homotopy Asymptotic Approach to Nonlinear Dynamical Systems in Engineering	No:	51
Chair Name:	Nicolae Herisanu		
Hours	Paper Title	Author	
10.00-10.20	An Approximate Solution in the Nonlinear Dynamics of an Electromagnetically-Actuated Cantilever Beam	Nicolae Herisanu, Bogdan Marinca, Vasile Marinca	
10.20-10.40	An analytical investigation of the human vocal fold oscillation using a mucosal wave model	Laura Jurca, Cosmina Vigaru, Nicolae Herisanu	
10.40-11.00	Nonlinear Oscillations of an Electromagnetically-Actuated Beam in the Presence of Van der Waals Force	Nicolae Herisanu, Vasile Marinca, Cristina Opritescu	
11.00-11.20	Analytical solution for the motion of the center of mass of the human body	Andreea Stoia, Dan Ioan Stoia, Nicolae Herisanu	

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Virtual Room 3

Session Name:	Advances in nonlinear control, estimation and fault diagnosis for complex dynamical systems	No:	30
Chair Name:	Gerasimos Rigatos		
Hours	Paper Title	Author	
11.00-11.20	Nonlinear optimal control of heat pumps in electric vehicles	G. Rigatos, P. Siano, G. Cuccurullo and M. Abbaszadeh	
11.20-11.40	Nonlinear control of a gas compressor driven by an electric motor	G, Rigatos, M. Abbaszadeh, B. Sari, P. Siano, G. Cuccurullo and F. Zouari	
11.40-12.00	Nonlinear optimal control for a 4-DOF SCARA robotic manipulator	G. Rigatos, M. Abbaszadeh, G. Cuccurullo, K. Busawon and J. Pomares	

Virtual Room 4

Session Name:	**Mathematical Modeling, Numerical Algorithms, Optimization Methods and Flow Control for Aerospace Techniques**	No:	45
Chair Name:	Alexandru DUMITRACHE, Constantin LEVENTIU		
Hours	Paper Title	Author	
11.00-11.20	*Full automation of Aeronautical Meteorological Information's*	Emil COSTEA, Gabriela-Liliana STROE, Daniel-Eugen CRUNTEANU, Mihaela-Luminita COSTEA	
11.20-11.40	*Realization of the Meteorological Assistance of the activities civil aviation*	Emil COSTEA, Gabriela-Liliana STROE, Daniel-Eugen CRUNTEANU, Mihaela-Luminita COSTEA	
11.40-12.00	*Study of Global Systems, Support Centers and Weather Units Aviation*	Emil COSTEA, Gabriela-Liliana STROE, Daniel-Eugen CRUNTEANU, Mihaela-Luminita COSTEA	
12.00-12.20	*Notes on calculating airplane longitudinal maneuvers: numerical and approximate analytical solution*	Laurentiu Moraru	
12.20-12.40	*Design and analysis of an autonomous wind-photovoltaic hybrid system*	Alexandru Dumitrache, Sergiu-Alexandru Popescu, Radu Bogateanu, Bogdan Suatean	

11.30-13.30

Room 1 – Virtual Invited Lectures

INVITED LECTURE

Chair: L.Brugnano

Hours	Paper Title	Author
11:30-12:30	Solving nonlinear second-order boundary value problems with time-variable delay via implicit Runge-Kutta-Nyström methods	Chengjian Zhang

Virtual Room 5 -ROOM 5			
Session Name:	Modelling Progress in Aerospace Science MPAS-2022	No:	35
Chair Name:	C. Orlando, A. Ferrero, A. Esposito, S. Valvano		
Hours	Paper Title	Author	
11.45-12.00	Automatic wind identification for UAS: a case study	F. Montano, I. Benedetti	
12.00-12.15	Range Estimation Of A Novel Concept Electric Aircraft	L. Nanu, A. Lerro, P. Gili	
12.15-12.30	An alternative beam FE for aeroelastic analysis of flapped wings	C. R. Vindigni, G. Mantegna, C. Orlando, A. Alaimo	
12.30-12.45	Statistical Volume Element analysis of additivaly manufactured metal media	G. Mantegna, C. R. Vindigni, S. Valvano, A. Alaimo, D. Tumino, C. Orlando	
12.45-13.00	The Method of Boundary Integral Equations in Boundary Value Problems of Aerodynamics and Gas Dynamics of Aircraft BOUNDARY VALUE PROBLEMS OF AERODYNAMICS AND GAS DYNAMICS OF AIRCRAFT	Y. Krashanytsya	

13.30-17.00

Room 4

Session Name:	Recent Trends in Inverse Problems in Imaging – Reconstruction, Regularization and Modalities	No:	57
Chair Name:	Jürgen Frikel		
Hours	Paper Title	Author	
14.00-14.30	Variational multichannel multiclass segmentation via unsupervised lifting with CNNs	Nadja Gruber	
14:30 - 15:00	Translation Invariant Frames and Regularization in Inverse Problems	Simon Göppel	
15:00 - 15:30	Solving Higher-Order Mumford-Shah Models	Andreas Weinmann	

Room 5

Session Name:	General Session	No:	GS
Chair Name:			
Hours	Paper Title	Author	
14.00-14.30			
14:30 - 15:00			
15:00 - 15:30			
15.30-16.00			
16.00-16.30			
16.30-17.00			

17.00 – 17.30	**Coffee Break**

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Room 6

Session Name:	General Session	No:	GS
Chair Name:	M. Saiid Saiidi		
Hours	Paper Title	Author	
14.00-14.30	Analytical Studies of Residual Lateral Displacement Limit in Bridges Subjected to Earthquakes	M. Saiid Saiidi and S. Mohammad Ardakani	
14:30 - 15:00	Parameter identification in contact problems for Gao beam and obstacle	Jana Radová and Jitka Machalová	
15:00 - 15:30	A robust computational method to solve a class of real estate exotic options	M. Dube and K.C. Patidar	
15.30-16.00	Evaluation of the Digital Capabilities of Energy Companies	Burak Berkay Havle and Mehtap Dursun	
16.00-16.30	New Algebraic Insights to the Goldbach Conjecture	Aliaa Burqan	
16.30-17.00	Rectilinear Motion of Mass Source in Non-Uniformly Stratified Fluid	Dmitri Knyazkov, and Alexey Shamaev	

Poster Session

Session Name:	General Session	No:	GS
17.00 – 18.00			
Modeling and Simulation of Passive Bipedal Locomotion Systems with Hybrid Dynamics	Slavka Jadlovska, Anna Jadlovska and Lukas Koska		
Modeling and Optimal Control of Underactuated Mechanical Systems	Slavka Jadlovska, Anna Jadlovska, Miroslav Uhlar and Jan Pitel		
On Thermopiezoelectric Bleustein-Gulyaev Waves	A. Montanaro		

17.00 – 17.30	**Coffee Break**

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END OF DAY 5

24 September 2022

09.00-14.00

Room 2 - Virtual Room 1 – Invited Lectures

INVITED LECTURE

Chair: L.Brugnano

Hours	Paper Title	Author
10:00-11:00	Reconstruction of High-Resolution Wavefronts in Ground-based Astronomy	Raymond Chan

Virtual Room 1

Session Name:	General Session	No:	GS
Chair Name:			
Hours	Paper Title	Author	
11.30-12.00	Second-order Method for Quasilinear Singularly Perturbed Parameterized Problems with Integral Boundary Condition	Shashikant Kumar	
12.00-12.30	Multistep Block Method with Equidistant Hybrid Points for Solving Fifth Order Initial Value Problems	Oluwaseun Adeyeye , Zurni Omar and Kamarun Hizam Mansor	
12.30-13.00	Numerical investigations into aerodynamics of Multi MegaWatt wind turbines under yawed flow	M. Keerthana, Johannes Nicolaas Theron and Bernhard Stoevesandt	
13.00-13.30	A Fractional Simulation of Laser Drilling Process on Graded Mesh	Ayman. F. Hassan Dia Abidou A. Elsaid and W. K. Zahra	

Virtual Room 2

Session Name:	General Session	No:	GS
Chair Name:			
Hours	Paper Title	Author	
09.00-09.30	Designing a Parallel Nonlinear Model for Predicting Nitrogen Oxide Emissions	Violeta Migallón, Francisco José Navarro-González, Héctor Penadés, José Penadés, and Yolanda Villacampa	
09.30-10.00	Fast Enclosure for Real Powers of Large Matrices with Kronecker Structure	Shinya Miyajima	
10.00-10.30	Computing the Enclosure for Perron Vectors of Weakly Irreducible Nonnegative Tensors	Shinya Miyajima	
10.30-11.00	Semigroup theory and analysis of solutions for a higher order non-Lipschitz problem with advection in RN .	Jose Luis Dıaz Palencia	

Virtual Room 2

Session Name:	General Session	No:	GS
Chair Name:			
Hours	Paper Title	Author	
11.00-11.30	Approximation of special monogenic functions by equivalent bases of polynomials in Frechet modules.	Mohra Zayed	
11.30-12.00	Stability analysis for the discrete finite element model of the Pennes bio-heat equation	Gangadhara B and Panchatcharam Mariappan	
12.00-12.30	Biologically Inspired Algorithms Applied in Automatic Tuning of Parallel Solver Parameters for Fast Execution Times	Tomas Panoc, Ondrej Meca Lubomır Rıha Tomas Brzobohaty and Tomas Kozubek	
12.30-13.00	A SPH method based on AMR grid cells	Xiangfei Gong and Jiming Yang	
13.00-13.30	How to choose an appropriate initial condition to simulate stochastic differential equations stably	Guoguo Yang, Kevin Burrage, Pamela Burarge and Xiaohua Ding	

Virtual Room 3

Session Name:	General Session	No:	GS
Chair Name:			

Hours	Paper Title	Author
09.00-09.30	A Novel Active Learning Strategy For Structural Reliability Analysis Based On Radial Basis Function Network Without Prediction Variance	Yanjin Wang
09.30-10.00	Fluid Structure Interaction Analysis of a Centrifugal Compressor with Impeller Backside Cavity	Manu Prabha Anand, Abhilash Suryan, and Heuy Dong Kim
10.00-10.30	Theoretical Analysis of Compressible Flows in Ranque-Hilsch Vortex Tube	Kannan Shaji Kangki Lee and Heuy Dong Kim
10.30-11.00		

Virtual Room 3

Session Name:	General Session	No:	GS
Chair Name:			

Hours	Paper Title	Author
11.00-11.30	Detecting A Homoclinic Bifurcation In A Pendulum Motion Using Numerical-Topological Approach	Ibrahim Jawarneh, Nesreen Alsharman and Raja M. T Masadeh
11.30-12.00	LAR-PCE based Stochastic Kriging for non parametric problems	J.C. García-Merino, E. García-Macías, and C. Calvo-Jurado
12.00-12.30	Two-Scale Modeling of Supersonic Cold Gas Dynamic Spraying of Nanoparticles on Substrate	V.O. Podryga , S.V. Polyakov , G.A. Bagdasarov , and P.I. Rahimly
12.30-13.00	Multiple Time Stepping Methods for Numerical Simulation of Charge Transfer by Mobile Discrete Breathers	Janis Bajars and Juan F. R. Archilla
13.00-13.30	Muldowney Class Asymptotic Properties: An Overview	Codruta Stoica

Virtual Room 4

Session Name:	General Session	No:	GS
Chair Name:			

Hours	Paper Title	Author
09.00-09.30	Modelling the Bacterial Self-Organisation: The Effect of Modulation of Oxygen Consumption Rate	Boleslovas Dapkunas, Romas Baronas, and Žilvinas Ledas
09.30-10.00	Euclidean Jordan Algebras and Properties of Strongly Regular Graphs	Luıs Antonio de Almeida Vieira
10.00-10.30	Memory-Based Model of Drug Release from Metformin Hydrochloride/Vildagliptin Tablets	M. Khalaf A. Elsaid S. F. Hammad and W. K. Zahra
10.30-11.00	Mathematical Modeling of Ways to Improve the Efficiency of Fuel Combustion in Combustion Devices	Vladislav N. Kovalnogov , Ruslan V. Fedorov , Sergey V. Bysigin , Dmitry A. Generalov

Virtual Room 4

Session Name:	General Session	No:	GS
Chair Name:			

Hours	Paper Title	Author
11.00-11.30	An Adaptive Strategy For Co-Kriging Model Based On Expected Prediction Error	Yanjin Wang
11.30-12.00	Binary Classification Aggregation Approaches to Technical Diagnostics with Application of Machine Learning	I.N. Karpunina , V.N. Klyachkin, V.N.Kovalnogov, M.I. Kornilova, A.A. Santalov
12.00-12.30	Mathematical Modeling of the Fuel Combustion Process	Vladislav N. Kovalnogov , Ruslan V. Fedorov., Yuri A. Khakhalev, Maria I. Kornilova, Larisa V. Khakhaleva, Ekaterina V. Tsvetova
12.30-13.00	Application of fuzzy logic for the problems of effective control of wind turbines	Vladislav N. Kovalnogov , Ruslan V. Fedorov , Larisa V. Khakhaleva , Andrei V. Chukalin, Maria I. Kornilova
13.00-13.30	More on The fuzzy Topological Spaces on A fuzzy space (X, I)	Ibrahim Jawarneh, Abd Ulazeez Alkouri, Mohammad Hazaimeh and Zuhier Altawallbeh

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Virtual Room 5

Session Name:	13.The methods of development intelligent and adaptive control for problems of physical, biological and socio-economic processes modeling	No:	13
Chair Name:	Alexander Kvitko		

Hours	Paper Title	Author
09.00-09.20	On a method for solving a global boundary problem for a quasi-linear non stationary system with perturbations in the class of piecewise constant controls	Kvitko A.
09.20-09.40	Strategy for maximizing information influence in social networks	E.A.Kalinina, E. A. Lezhnina, V. A. Karpenko and. A. Kononov
.9.40-10.00	The Problem of PayoffDistribution in a Teamas a Cooperative Game	Shirin AL Manai,Oleg Malafeyev,Irina Zaitseva,Dmitry Kolesov,Tatiana Smirnova,Igor Kefeli, Lydia Novozhilova,Andrey Shulga and Bezrukikh Vladimir
10.00-10.20	The Dynamic Filtration Method in the Approximation Problem	Valentina Chashnikova
10.20-10.40	Mathematical Modeling of Fluid Flow over an Uneven Bottom in the Presence of a Free Surface	Sergey I. Peregudin and Svetlana E. Kholodova
10.40-11.00	Analysis of the Control Set for the Generalized Rayleigh Equation	A.V. Ekimov, Yu.E. Balykina, M.V. Svirkin

Virtual Room 5			
Session Name:	General Session	No:	GS
Chair Name:			
Hours	Paper Title	Author	
11.00-11.30	On the Simple Divisibility Restrictions by Polynomial Equation an+bn=cn Itself in Fermat Last Theorem for Integer/Complex/Quaternion Triples	Sandor Kristyan	
11.30-12.00	Generalization of Cantor Pairing Polynomials (Bijective Mapping Among Natural Numbers) from N02N0 to Z2N0 and N03N0	Sandor Kristyan	
12.00-12.30	Analyzing Semi Stable Limit Cycle in Dynamical Systems Using Algebraic Topological Method	Ibrahim Jawarneh, Zuhier Altawallbeh, Shrideh Al-omari and Bilal Al-Hasanat	
12.30-13.00	Three-point Bending Tests of UHPC Specimens with Basalt Fibres	Vladimır Sana, Jirı Litos and Martin Keppert	
13.00-13.30	Exact vs approximated ML estimation for the Box-Cox transformation	Rui Gonçalves	
13.30-14.00	Scattering of Discrete Solitons from an Impurity in the Saturable Nonlinear Schrodinger Equation	J. Tsoplefack, F. Palmero A. Provata D.J. Frantzeskakis and J. Cuevas-Maraver	

END OF DAY 6

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25 September 2022

END OF CONFERENCE

ABSTRACT BOOKLET

for SESSION#9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and Their Applications (GFSNP2022)

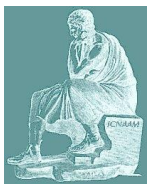
within

THE 20th INTERNATIONAL CONFERENCE OF NUMERICAL ANALYSIS AND APPLIED MATHEMATICS (ICNAAM 2022)

ISBN: 978-9925-7552-3-3

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

within



20th International Conference on Numerical Analysis and Applied Mathematics ICNAAM 2022

Heraklion, Crete, Greece 19-25 September 2022, Galaxy Hotel

SESSION#9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and Their Applications (GFSNP2022)

Organizer: Prof. Dr. Yilmaz SIMSEK, AKDENIZ UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF MATHEMATICS 07058, ANTALYA TURKEY.

Contact: Tel: +90 242 310 23 43, Fax:+ +90242227 89 11

E-mail: ysimsek63@gmail.com

Personal Web Sites of Organizer: http://aves.akdeniz.edu.tr/ysimsek

Web Site of mini symposia: http://icnaam.org/sessions_minisymposia.htm

Aims and Scope

The goal of the symposium GFSNP2022 is to bring together all the researchers working in various fields of Mathematics, Applied Mathematics, Mathematical Physics and related areas such as Analysis, Non-linear Analysis, Number Theory, Applied Algebra, p-adic Analysis, Special Functions, q-Analysis, Probability and Statistics, Mathematical Engineering and their applications. Our main aim is also to bring together theoretical, numerical and applied analysts, number theorists, (quantum) physicists working in the areas of generating functions of the special numbers and polynomials and their applications. All of the participants will likely lead to significant uncover new connections on these fields which are families of special numbers and polynomials, the others, and also families of zeta functions, and L-functions.

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E-mail: chairman@icnaam.org, tsimos.conf@gmail.com, tsimos.conf@yahoo.com

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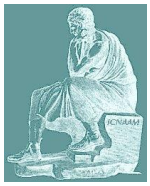
Mr. George Vordonis

Topics of ICNAAM2022

Topics to be covered include (but are not limited to):

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

within



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- **All the research areas of Numerical Analysis and Computational Mathematics:** Numerical ODEs, Numerical PDEs (inc. BVPs), Scientific Computing and Algorithms, Stochastic Differential Equations, Approximation, Numerical Linear Algebra, Numerical Integral Equations, Error Analysis and Interval Analysis, Difference Equations and Recurrence Relations, Numerical problems in Dynamical Systems, Applications to the Sciences (Computational Physics, Computational Statistics, Computational Chemistry, Computational Engineering etc.), Differential Algebraic Equations, Numerical methods in Fourier analysis, etc.
- **All the research areas of Applied and Industrial Mathematics:** Mathematical Physics, Mathematical Chemistry, Mathematical Biology and Mathematical Medicine, Optimization and Operational Research, Theoretical Mechanics, Discrete Applied Mathematics, Statistics, Probability, Dynamical Systems, Algorithms, Experimental Mathematics, Theoretical Computer Science, Applied Analysis, Mathematical Modelling including but not limited to: mathematical modelling of engineering and environmental processes manufacturing, and industrial systems, heat transfer, fluid mechanics, CFD, and transport phenomena, solid mechanics and mechanics of metals, electromagnets and MHD, reliability modelling and system optimization, decision sciences in an industrial and manufacturing context, civil engineering systems and structures, mineral and energy resources, relevant software engineering issues associated with CAD and CAE, materials and metallurgical engineering, mathematical modelling of social, behavioral and other sciences, Decomposition and Reconstruction Algorithms, Subdivision Algorithms, Continuous and Discrete Wavelet Transform, Time-frequency Localization, Phase-Space Analysis, Subband Coding, Image Compression, Real-Time Filtering, Radar and Sonar Applications, Transient Analysis, Medical Imaging, Multigrid Methods, Frames, Bifurcation and Singularity Theory, Deterministic Chaos and Fractals, Soliton and Coherent Phenomena, Formation of Pattern, Evolution, Complexity Theory and Neural Networks, Analytical Approaches and Simulations for more Accurate Descriptions, Predictions, Experimental Observations and Applications of Nonlinear Phenomena in Science and Engineering, Theoretical and Applied aspects of Computational Geometry, Control Theory and Automation, Fuzzy Sets and Systems and Fuzzy Logic, Applied Algebra, Quality Theory of Differential Equations, Neural Networks, etc.

PROGRAM

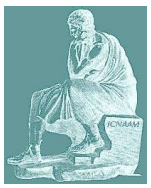
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20 September 2022

SESSION#9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and Their Applications (GFSNP2022)

CHAIR Name: Yilmaz SIMSEK

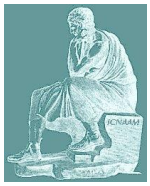
(PHYSICAL ROOM)

09:00 – 09:20	***Yilmaz SIMSEK***	A Note on Certain Classes of Finite Sums II
09:20 – 09:40	***Isabel CAÇÃO, M.I. FALCÃO, H.R. MALONEK and G. TOMAZ***	Relating Certain Coefficients of Special Hyperholomorphic Polynomials with a Horadam Sequence II
09:40 – 10:00	***Geno NIKOLOV***	On the Extreme Zeros of Jacobi Polynomials
10:00 – 10:20	***Dimitar K. DIMITROV, Ivan GADJEV, Geno NIKOLOV and Rumen ULUCHEV***	On the Sharp Constant in Inequalities of Hardy Type
10:20 – 10:40	***Mustafa Gurhan YALCIN, Sezer UNAL, Ozge Ozer ATAKOGLU, Fusun YALCIN***	Statistical Evaluation of Chemical Contents of Damlatas (Alanya/ Antalya) Beach Sand II
10:40 – 11:00	***Niyazi Uğur KOÇKAL and Nazli Ipek KUL GUL***	Design and Production of Composite Materials II
11:00 – 11:30	COFFEE BREAK	
11:30 – 13:30	INVITED SPEAKER LECTURES	

20 September 2022

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

within

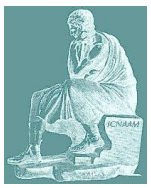


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SESSION#9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and Their Applications (GFSNP2022) **CHAIR Name: Mustafa Gurhan YALCIN** **(PHYSICAL ROOM)**		
13:40 – 14:00	***Irem KUCUKOGLU***	Derivation of Some Formulas for Stirling-type Numbers by *p*-adic Integration II
14:00 – 14:20	***Neslihan KILAR***	Notes on Fubini Type Numbers and Their Properties II
14:20 – 14:40	***Damla GUN and Yilmaz SIMSEK***	Commentaries on Relations for Apostol Type and Special Polynomials II
14:40 – 15:00	***Buket ŞİMŞEK, Ayhan ŞAVKLIYILDIZ, Esra SÜZEN, Övünç POLAT, Ömer H. ÇOLAK***	On the Evaluation of Statistical and Mathematical Solutions in EMG Analysis II
15:00 – 15:20	***Neslihan KILAR***	Remarks on Combinatorial Numbers Containing Special Numbers and Polynomials II
15:20 – 15:40	***Damla GUN and Yilmaz SIMSEK***	Formulas for Calculating Numerical Values of Combinatorial Sums Involving Apostol Bernoulli Numbers and Polynomials II
15:40 – 16:00	***Abdelmejid BAYAD***	Identities on Higher Lerch Zetas Involving Polynomial Coefficients II
16:00 – 16:20	***Daeyeoul KIM and Yilmaz SIMSEK***	Notes on Formulas for Apostol Type Numbers and Polynomials Derived from Partial Multiple Euler Type Zeta Function II
16:20 – 16:40	***Carlos LÓPEZ***	TBA
16:40 – 17:00	***Sithembele NKONKOBE***	TBA
17:00 – 17:30	COFFEE BREAK	

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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17:30 – 18:30	INVITED SPEAKER LECTURES	
20 September 2022 **SESSION#9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and Their Applications (GFSNP2022)** **CHAIR Name: Yilmaz SIMSEK** **(VIRTUAL ROOM)**		
18:40 – 19:00	***Zekiye ÇİLOĞLU ŞAHİN***	Some Results on Generalized Symmetric Bi-Jordan Derivation on Prime Rings II
19:00 – 19:20	***Erkan AGYUZ***	On Convergence Properties of Fubini Type Polynomials II
19:20 – 19:40	***Erkan AGYUZ***	A Note on Bernoulli and Euler Type Numbers and Polynomials II
19:40 – 20:00	***Mine MENEKSE YILMAZ***	A Study on Order of Convergence of Generalized Chlodovsky-Szász Type Operators II
20:00 – 20:20	***Mine MENEKSE YILMAZ***	On Voronovskaya Type Result for Generalized Jakimovski-Leviatan Operators II
20:20 – 20:40	***Hasan Muhammed AKTAS***	A New Family of Arithmetic Sequence Associated with the Lucas Numbers II
20:40 – 21:00	***Rifat BATTALOGLU***	Mathematical Modelling of Microwave Assisted Soxhlet Extraction of Fatty Acid Components from Prunus Laurocerasus Fruit Grown in Turkey II
21:00 – 21:20	***Junaid Fouad KAREEM KAREEM and Yasemin LEVENTELI***	Regression Analysis of Chemical Contents of Goynuk Stream (Antalya) Surface Waters II

ABSTRACTS

of SESSION#9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and Their Applications (GFSNP2022)

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Notes on Generating Functions of Special Numbers and Polynomials and Their Applications

Yilmaz Simsek[1, a)]

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Abstract. Our aim in this study is to survey powers and usages of generating functions. These functions have recently taken part in many researcher studies. Because generating functions of special numbers and polynomials and their applications have been used in many applied sciences.

2010 Mathematics Subject Classification. 05A15, 26C05, 33B10.

Key Words and Phrases. Generating function, Special Numbers and polynomials.

Introduction

The first definition of the generating function was given by Abraham de Moivre in 1730. Abraham de Moivre used generating functions in order to solve the general linear recurrence problem (cf. [1,2]). Today, there are many ways to introduce generating function, which is a way of encoding an infinite sequence of numbers (an) by treating them as the coefficients of a formal power series that is called the generating function of the sequence. Unlike an ordinary infinite series, the formal power series is not required to converge. Thus, the generating function is not regarded as a function, and so the variable remains an indeterminate. How many type generating functions can be used in research studies (*cf.* [1-7]).

As I know that there are many different types of generating functions, which are given as follows:

- Ordinary generating functions (ODF): These are used for polynomial sequence generating functions involving numbers and polynomials and also for special functions, binomial coefficients, Rational functions, etc.
- Exponential generating functions (EGF): These are used for polynomial sequence generating functions involving numbers and polynomials and also for special functions, binomial coefficients, etc.
- Lambert series: These are used for the theta function, the q-series, the Eisenstein series, Modular forms etc.
- Bell series: These are used for the Bell numbers, the Stirling numbers, Combinatorial numbers and polynomials, etc.
- Dirichlet series generating functions (DGFs): These are used for the zeta type functions, L-type functions, and Lerch type zeta functions, etc.
- Poisson generating functions: These are used for probability distribution functions, infinite series, the Bernstein basis type functions, etc.

- Bivariate generating functions (BGF): These are used for many different areas, etc.
- Multivariate generating functions (MGF): These are used for many different areas, etc.
- Holonomic generating functions (HGF): These are used for the P-recursive sequences and also many different areas, etc.
- Linear generating functions (LGF),
- Bilinear generating functions (BiGF),
- Mixed generating functions (MGF),
- Bilateral generating functions (BlGF),

and so on.

The following operations can be used for generating functions: integral and differential operators, fractional derivative technique, Lie algebraic technique, z-transform, the Lagrange's expansion, multiplication involving convolution, Shifting sequence indices, Differentiation and integration of generating functions, Enumerating arithmetic progressions of sequences, etc. For detail information about generating functions see (*cf.* [1-7]).

Some Applications for Generation functions

All type generating functions have many applications in many branches of mathematics and mathematical physics, engendering and other applied sciences. Using generating functions, the following areas can be investigated and studied:

PDEs, ODEs, SDEs, Software for working with P-recursive sequences, discrete-time Fourier transform, asymptotic growth of a sequence, asymptotic growth of the sequence of squares, and also the Catalan numbers, Spanning trees of fans and convolutions, implicit generating functions for the Lagrange inversion formula, a free parameter (snake oil method), generating functions prove congruence, the Stirling numbers modulo small integers, congruence for the partition function, transformations of generating functions, Convolution Polynomials, *p*-adic integrals and their integral equations, hypergeometric series and functions, other applications.

References

[1] HandWiki, *Generating function*, 27.07.2022 18:03.
[2] D. E. Knuth, *Fundamental Algorithms. The Art of Computer Programming*: *§1.2.9 Generating Functions* (3rd ed.), (Addison-Wesley, 1997).
[3] W. H. Schikhof, *Ultrametric Calculus: An Introduction to p-adic Analysis*, Cambridge Studies in Advanced Mathematics 4, (Cambridge University Press Cambridge, 1984).
[4] Y. Simsek, *Explicit Formulas For p-adic integrals: Approach to p-adic Distributions and Some Families of Special Numbers and Polynomials*, Montes Taurus J. Pure Appl. Math. 1 (1), 1-76, (2019).
[5] Y. Simsek, *Generating functions for generalized Stirling type numbers, Array type polynomials, Eulerian type polynomials and their applications*, Fixed Point Theory Appl. 87, 1-28 (2013).
[6] Y. Simsek, *New families of special numbers for computing negative order Euler numbers and related numbers and polynomials*, Appl. Anal. Discrete Math. 12, 1-35 (2018).
[7] H. M. Srivastava and H. L. Manocha, *A Treatise on Generating functions*, (Ellis Horwood Series Mathematics and its applications, 1984).

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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Relating Certain Coefficients of Special Hyperholomorphic Polynomials with a Horadam Sequence II

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Abstract. We consider higher dimensional polynomials that generalize the classical holomorphic powers of one complex variable in the framework of hypercomplex function theory. We show how a certain relation involving the coefficients of those polynomials turn out to be an extended Horadam sequence of rational numbers.

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Key Words and Phrases. Hyperholomorphic (monogenic) polynomial, Horadam sequence, recurrence relation.

Introduction

Hypercomplex function theory generalizes the theory of holomorphic functions of one complex variable to higher dimensions in the framework of Clifford algebras. Due to the non-commutativity of the underline algebra, powers of one hypercomplex variable and corresponding polynomials do not belong to the set of hyperholomorphic (generalized holomorphic) functions. However, special combinations of two non-hyperholomorphic variables results on hyperholomorphic polynomials that behave like usual powers under derivation. They were constructed in [3] and some applications were given (see also [1]). The coefficients of these polynomials are the rational numbers

$$T_s^k(n) := \binom{k}{s} \frac{\left(\frac{n+1}{2}\right)_{k-s} \left(\frac{n-1}{2}\right)_s}{(n)_k},\ k = 0, 1, 2, \ldots; s = 0, 1, 2, \ldots k,\ n = 1, 2, \ldots,$$

where $(.)_k$ is the Pochhammer symbol. In [4], the authors showed that they form a partition of the unit $\sum_{s=0}^{k} T_s^k(n) = 1$, independently of the value of n. In the same paper, the authors arranged these coefficients as non-symmetric triangular arrays of Pascal type and studied their properties, concerning columns, rows, diagonals and neighboring elements. The paper [2] continues these studies by focusing on properties of the main diagonal elements, as well as some relations involving sums of $T_s^k(n)$ that recover known identities satisfied by binomial coefficients when $n \to \infty$. Here we consider the n-parameter sequence $\left(D_k(n)\right)_{k \in \mathbb{N}_0}$, formed by the alternating partial sums of the main diagonal elements, i.e.

$$D_k(n) := \sum_{s=0}^{k}(-1)^s T_k^k(n) = \frac{\left(\frac{n-1}{2}\right)_k}{(n)_k}, \quad k = 0, 1, 2, \ldots, \; n = 2, 3, \ldots, \qquad (1)$$

and we prove that in the limit case $n \to \infty$, the sequence $\left(D_k(\infty)\right)_{k\in\mathbb{N}_0}$ turns out to be a Horadam sequence extended to rational numbers. The so-called Horadam sequences generalize the Lucas sequences by considering arbitrary initial values (see [5]). More precisely, given a 4-tuple of integer numbers $(a, b; p, q)$, a Horadam sequence $\left(W_k(a, b; p, q)\right)_{k\in\mathbb{N}_0}$, or briefly, $(W_k)_{k\in\mathbb{N}_0}$, is a sequence of integer numbers that satisfies the recurrence

$$W_0 = a; \qquad W_1 = b; \qquad W_k = p\,W_{k-1} - q\,W_{k-2}, k = 2, 3, \ldots. \qquad (2)$$

Depending on the given 4-tuple $(a, b; p, q)$, this recurrence generates several known numbers: e.g. $(0, 1; 1, -1)$ Fibonacci; $(2, 1; 1, -1)$ Lucas; $(0, 1; 2, -1)$ Pell; $(0, 1; 1, -2)$ Jacobsthal; among others.

Main Result

Theorem The sequence $\left(D_k(\infty)\right)_{k\in\mathbb{N}_0}$ coincides with the extended Horadam sequence $\left(W_k\left(1, \frac{1}{2}; \frac{1}{2}, -\frac{1}{2}\right)\right)_{k\in\mathbb{N}_0}$.

Proof From (1) it follows that $D_k(\infty)=D_{k-2}(\infty)+(-1)^{k-1}T_{k-1}^{k-1}(\infty)+(-1)^k T_k^k(\infty)$. Taking into account that $T_k^k(\infty) = 2^{-k}$, we have $T_k^k(\infty) = 2^{-1}T_{k-1}^{k-1}(\infty)$ and substituting in the last expression, it follows

$$2D_k(\infty)=2D_{k-2}(\infty)+(-1)^{k-1}T_{k-1}^{k-1}(\infty).$$

Observing now that $D_{k-2}(\infty)+(-1)^{k-1}T_{k-1}^{k-1}(\infty) = D_{k-1}(\infty)$, it holds

$$D_k(\infty)=\frac{1}{2}D_{k-1}(\infty)+\frac{1}{2}D_{k-2}(\infty), \quad k = 2, 3, \ldots.$$

Moreover, $D_0(\infty)=1$ and $D_1(\infty)=\frac{1}{2}$, obtaining the recurrence (2) for $a = 1; b = \frac{1}{2}; p = \frac{1}{2}$ and $q = -\frac{1}{2}$.

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References

[1] Cação I., Falcão M.I., Malonek H., *Laguerre derivative and monogenic Laguerre polynomials: an operational approach*, Math. Comput. Model. **53** (2011), no. 5-6, 1084-1094.

[2] Cação I., Falcão M.I., Malonek H., Tomaz G., *Non-symmetric number triangles arising from Hypercomplex Function Theory in* $\mathbb{R}^{n+1}$, Lecture Notes in Computer Science, vol **13377**. Springer, Cham. (2022) 420-434.

[3] Falcão M. I., Malonek H. R., *Generalized exponentials through Appell sets in* $\mathbb{R}^{n+1}$ *and Bessel functions*, AIP Conf. Proc., vol. **936**, (2007) 738-741.

[4] Falcão M. I., Malonek H. R., *A note on a one-parameter family of non-symmetric number triangles*, Opuscula Math., **32 (4)**, (2012) 661-673.

[5] Horadam, A.F., *Generating functions for powers of a certain generalized sequence of numbers*, Duke Math.J., **32** (1965), 437-446.

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A New Family of Arithmetic Sequence Associated with the Lucas Numbers II

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Abstract. The goal of this presentation is to investigate many properties of a new class of arithmetic sequences associated with the Fibonacci numbers and the Lucas numbers. Some new formulas of these sequences are also given.

Subject Classification. 05A15, 11B37, 11B39.

Key Words and Phrases. Arithmetic sequence, Fibonacci numbers, Lucas numbers, Golden ratio, Generating functions.

Introduction

The Fibonacci numbers, F_m, are defined by the following recurrence relation:

$$F_{m+2} = F_{m+1} + F_m; \quad m \in \mathbb{N} \cup \{0\}$$

where $F_0 = 0$ and $F_1 = 1$ (*cf.* [1]-[10]).

The Lucas numbers, L_m, are defined by the following recurrence relation:

$$L_{m+2} = L_{m+1} + L_m; \quad m \in \mathbb{N} \cup \{0\}$$

where $L_0 = 2$ and $L_1 = 1$ (*cf.* [1]-[10]).

By using the above recurrence relation, we have some values of the Fibonacci numbers as follows:

$$F_2 = 1, \qquad F_5 = 5,$$
$$F_3 = 2, \qquad F_6 = 8,$$
$$F_4 = 3, \qquad F_7 = 13,$$

and so on (*cf.* [1]-[10]).

By using the above recurrence relation, we have some values of the Lucas numbers as follows:

$$F_2 = 3, \qquad F_5 = 11,$$
$$F_3 = 4, \qquad F_6 = 18,$$
$$F_4 = 7, \qquad F_7 = 29,$$

and so on (*cf.* [1]-[10]).

These numbers are also given by the following the Binet formula:

$$F_m = \frac{\alpha^m - \beta^m}{\alpha - \beta}$$

$$F_m = \alpha^m - \beta^m$$

where

$$\alpha = \frac{1+\sqrt{5}}{2}$$

and

$$\beta = \frac{1-\sqrt{5}}{2}$$

(*cf.* [5-6]).

For a positive integer *j*, the general term of any arithmetic sequence $(x_j)_{j=1}^{\infty}$ is given by

$$x_j = x_1 + (j-1)k$$

where x_1 is the first term, *k* is a common difference between the consecutive terms of the arithmetic sequence (*cf.* [1,2,3,4,7,8,9]).

In [2-3], by using the Fibonacci numbers, we defined the following sequence, $(h_n(m,k))_{n=1}^{\infty}$. By using same method, we will define a new family of sequences based on the Lucas numbers. The aim of this presentation is to study some properties of these arithmetic sequences. By using the Fibonacci numbers and the Lucas numbers, we will give some formulas for these new families of arithmetic sequences.

Conclusion

In future studies, using arithmetic sequences involving the Fibonacci numbers and the Lucas numbers, we will study on these sequences. Moreover, we will investigate some fundamental properties these sequences.

References

[1] M. Abramowitz and I. A. Stegun, Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables, (Dover: New York 1965).
[2] H. M. Aktas, A new class of Arithmetic sequence based on Fibonacci numbers II, ABSTRACT BOOKLET, for SESSION#4: The 10th Symposium on Generating Functions of Special Numbers and Polynomials and Their Applications (GFSNP2021) within the 19th International Conference Of Numerical Analysis And Applied Mathematics (ICNAAM 2021) ISBN: 978-9925-7552-2-6
[3] H. M. Aktas, A new class of arithmetic sequence based on Fibonacci numbers, AIP Conf. Proc. 2022.
[4] G. E. Andrews. The Geometric Series in Calculus. The American Mathematical Monthly 105 (1), 36--40 (1998).
[5] T. Koshy, Fibonacci and Lucas numbers with applications, (John Wiley \& Sons. Inc: New York, Toronto, 2001).
[6] T. Koshy, Pell and Pell–Lucas Numbers with Applications, Springer, New York 2014
[7] F. Mynard, An Introduction to the Language of Mathematics, (Springer 2019).
[8] Math1, https://mathworld.wolfram.com/ArithmeticSeries.html
[9] Math2, https://en.wikipedia.org/wiki/Arithmetic_progression
[10] Math3, http://www.ijmttjournal.org/Volume-10/number-1/IJMTT-V10P503.pdf

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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On the Evaluation of Statistical and Mathematical Solutions in EMG Analysis II

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Abstract. In this presentation we study on electromyogram, which is the electrical activity. Electromyogram generally arises on muscles throughout the time of relaxation and contraction. As for the EMG, which is a neurological examination technic related to the diagnosis and distinction of the electrical potential both of nerves and striated muscles. The goal of this presentation to explain and study on direction for analysis orders of EMG. One of the methods frequently used in data analysis is feature extraction. The extracted features are used to diagnose the degree of disease or to classify the disease.

2010 Mathematics Subject Classification. 63H30, 62Q05, 68T99, 94A12, 92C55.

Key Words and Phrases. Statistical Analysis, EMG signal, Feature Extraction, Time Domain, Frequency Domain

Introduction

Thanks to the EMG signals obtained from the muscles, it can be used in the diagnosis of diseases by examining the harmony or differences between the muscles. EMG signals are not only an evaluation method to identify disease, they can also be used in different fields (i.e. athletes). Actually, improved analysis steps need to be created in the evaluation and description of signals. In order to present this study we focus on the work of not only Raez and his colleagues, but also on other studies for the EMG signal (*cf.* [1-26]).

Materials and Methods

The steps to be used in the analysis of an EMG signal are shown in Figure 1:

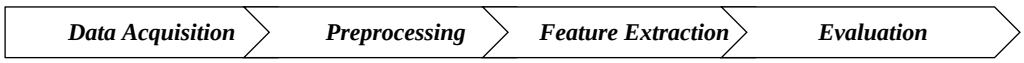


FIGURE 1. Generalized analysis of EMG signal

Some of the features to be extracted from the signal are briefly given in theTable 1:

TABLE 1. Time Domain and Frequency Domain Features

Time Domain Features			
Mean Absolute Values[4]	$MAV = \frac{1}{N}\sum_{i=1}^{N}\lvert x_i \rvert$	**Hjorth mobility parameter**[6]	$HMob = \sqrt{\frac{\left(\frac{dx(t)}{dt}\right)}{Var(x(t))}}$

Standard Deviation[7]	$STD = \left[\frac{1}{N-1}\sum_{i=1}^{N}(x_i-\bar{x})^2\right]^{\frac{1}{2}}$	**Difference absolute standard deviation value**[8,9]	$DASDV = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N-1}(x_{i+1}-x_i)^2}$
Variance[10]	$Var = \frac{1}{N-1}\sum_{i=1}^{N} x_i^2$	**Willison Amplitude**[10]	$WAM = \sum_{i=1}^{N} f(\lvert x_i - x_{i+1}\rvert) \quad f(x) = \begin{cases} 1 & x > RMS \\ 0 & otherwise \end{cases}$
Root Mean Square	$RMS = \sqrt{\frac{\sum_{i=1}^{N}\lvert x_i\rvert^2}{N}}$	**Sum Of Squared Difference**[13]	$SSD = \frac{\sum_i\sum_j(nRMS_A - nRMS_B)^2}{\sum_i\sum_j(nRMS_A + nRMS_B)^2} \cdot 100\%$
Number of Peak Count[8]	$NP = \sum_{i=1}^{N} x_i, \quad x_i = \begin{cases} 1 & x_i > RMS \\ 0 & otherwise \end{cases}$	**Maximum fractal length**[14,15]	$FDim(k) = \left\{\left(\sum_{i=1}^{\left[\frac{N}{k}\right]}\lvert X(ik) - X((i-1)*k)\rvert \frac{N-1}{N}\right)\right\}/k$
Mean firing velocity[16]	Average rate of fire is the difference or rate of peak values	**Skewness**[12]	$Skew = \frac{M_3}{M_2}\sqrt{M_2}, M_k = \frac{1}{N}\sum_{i=1}^{N}(x_i-\bar{x})^k$
Difference absolute mean value[10]	$DAMV = \frac{1}{N}\sum_{i=1}^{N-1}\lvert x_{i+i} - x_i\rvert$	**Kurtosis**[12]	$Kurt = \frac{M_4}{M_2 M_3}$
Frequency Domain Features			
Mean Frequency[14]	$MNF = \sum_{j=1}^{M} f_j p_j \Big/ \sum_{j=1}^{M} p_j$	**Power Spectral Density**[19]	$S_{xx}(f) = \int_{-\infty}^{\infty} R_{xx}(\tau)\exp(-i2\pi f\tau)\,d\tau$
Median Frequency[14]	$MDF = \frac{1}{2}\sum_{j=1}^{M} p_j$	**Wavelet Packet Transform Energy**[20]	$W_{rms,m,j} = \sqrt{\frac{1}{N}\sum \lvert W_{m,j}(r)\rvert^2}$

After the applied analysis steps, evaluation should be made as the last step. These evaluations can be made using both classification (i.e. Table 2) and statistical methods.

TABLE 2. *Popularly used classifiers*

Decision Trees[25]	**Ensemble Classification**[25]
Support Vector Machines[25]	**Naive Bayes Classifier**[25]
K-Nearest Neighborhood[21]	**Artificial Neural Networks**[25]
Discriminant Analysis[21]	

Statistical analyzes that can be used in the evaluation of the analyzes made will be based on our previous study ([26]).

Conclusion & Discussion

The analysis steps to be used in EMG signal analysis and similar neuroscience recording types will continue to be evaluated and developed

References

[1] M. Raez, M. Hussain and F. Mohd-Yasin, *Techniques of EMG signal analysis: Detection, processing, classification and applications*, Biological Procedures Online **8**, 11-35 (2006).
[2] B. Katirji, *Chapter 2 - Routine Clinical Electromyography*, In: Katirji B, ed. Electromyography in Clinical Practice (Second Edition). Mosby, 13-36 (2007).

[3] A. Merlo, D. Farina and R. Merletti, *A fast and reliable technique for muscle activity detection from surface EMG signals*, IEEE Transactions on Biomedical Engineering **50**(3), 316-323 (2003).
[4] M. Zecca, S. Micera, M. C. Carrozza and P. Dario, *Control of multifunctional prosthetic hands by processing the electromyographic signal*, Critical Reviews™ in Biomedical Engineering **30**, 4-6 (2002).
[5] K. T. Ozgünen, U. Celik, S. S. Kurdak, *Determination of an Optimal Threshold Value for Muscle Activity Detection in EMG Analysis*, J. Sports Sci. Med. **9**(4), 620-628 (2010).
[6] B. Hjorth, *EEG analysis based on time domain properties*, Electroencephalography and Clinical Neurophysiology **29**(3), 306-310 (1970).
[7] W. M. B. W. Daud, A. B. Yahya, C. S. Horng, M. F. Sulaima and R. Sudirman, *Features extraction of electromyography signals in time domain on biceps brachii muscle*, International Journal of Modeling and Optimization **3**(6), 515 (2013).
[8] K. S. Kim, H. H. Choi, C. S. Moon and C. W Mun, *Comparison of k-nearest neighbor, quadratic discriminant and linear discriminant analysis in classification of electromyogram signals based on the wrist-motion directions*, Current Applied Physics **11**(3), 740-745 (2011).
[9] S. Yu, E. Jeong, K. Hong and S. Lee, *Classification of nine directions using the maximum likelihood estimation based on electromyogram of both forearms*, Biomedical Engineering Letters **2**(2), 129-137 (2012).
[10] F. V. Tenore, A. Ramos, A. Fahmy, S. Acharya, R. Etienne-Cummings and N. V. Thakor, *Decoding of individuated finger movements using surface electromyography*, IEEE Transactions on Biomedical Engineering **56**(5), 1427-1434 (2008).
[11] B. Hudgins, P. Parker and R. N. Scott, A new strategy for multifunction myoelectric control, *IEEE Transactions on Biomedical Engineering* **40**(1), 82-94 (1993).
[12] L. Zoubek, S. Charbonnier, S. Lesecq, A. Buguet and F. Chapotot, *Feature selection for sleep/wake stages classification using data driven methods*, Biomedical Signal Processing and Control **2**, 171-179 (2007).
[13] X. Hu, N. L. Suresh, C. Xue and W. Z. Rymer, *Extracting extensor digitorum communis activation patterns using high-density surface electromyography*, Frontiers in Physiology **6**, 279 (2015).
[14] A. Phinyomark, P. Phukpattaranont and C. Limsakul, *Feature reduction and selection for EMG signal classification*, Expert systems with applications **39**(8), 7420-7431 (2012).
[15] S. P. Arjunan and D. K. Kumar, *Decoding subtle forearm flexions using fractal features of surface electromyogram from single and multiple sensors*, Journal of NeuroEngineering and Rehabilitation **7**(1), 53 (2010).
[16] M. J. Ortiz-Catalan, R. Brånemark and B. Håkansson, Biologically inspired algorithms applied to prosthetic control. BioMed 2012, Innsbruck, Austria(track 764), p. 035 (2012).
[17] M. Zardoshti-Kermani, B. C. Wheeler, K. Badie and R. M. Hashemi, *EMG feature evaluation for movement control of upper extremity prostheses*, IEEE Transactions on Rehabilitation Engineering 3(4), 324-333 (1995).
[18] S. Micera, A. M. Sabatini, P. Dario and B. Rossi, *A hybrid approach to EMG pattern analysis for classification of arm movements using statistical and fuzzy techniques*, Medical Engineering & Physics **21**(5), 303-311 (1999).
[19] E. Başar, *Brain Function and Oscillations: Brain Oscillations, Principles and Approaches*, (Springer, 1998).
[20] S. Bilgin, O. H. Çolak, E. Koklukaya and N. Arı, *Efficient solution for frequency band decomposition problem using wavelet packet in HRV*, Digital Signal Processing **18**(6), 892-899 (2008).
[21] S. Abbaspour, M. Lindén, H. Gholamhosseini and A. Naber and M. Ortiz-Catalan, *Evaluation of surface EMG-based recognition algorithms for decoding hand movements*, Medical & Biological Engineering & Computing **58**(1), 83-100 (2020).
[22] J. Fang, G. C. Agarwal and B. T. Shahani, *Decomposition of EMG signal by wavelet spectrum matching*, In: Proceedings of the 19th Annual International Conference of the IEEE Engineering

in Medicine and Biology Society. "Magnificent Milestones and Emerging Opportunities in Medical Engineering" (Cat. No.97CH36136) **3**, 1253-1256 (1997).

[23] D. Zennaro, P. Wellig, V. M. Koch, G. S. Moschytz and T. Laubli, *A software package for the decomposition of long-term multichannel EMG signals using wavelet coefficients*, IEEE Transactions on Biomedical Engineering **50**(1), 58-69 (2003).

[24] E. Plevin and D. Zazula, *Decomposition of surface EMG signals using non-linear LMS optimisation of higher-order cumulants*, In: Proceedings of 15th IEEE Symposium on Computer-Based Medical Systems (CBMS 2002), 149-154 (2002); doi:10.1109/CBMS.2002.1011369.

[25] C. C. Aggarwal, *Data Classification: Algorithms and Applications*, (Taylor & Francis 2014).

[26] B. Simsek and O. H. Colak, *Observations on Statistical Tests Used In Neuroscience*, Proceedings Book of MICOPAM 2018, p. 37.

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Commentaries on Relations for Apostol Type and Special Polynomials II

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Abstract. This presentation covers generating functions for some certain families of special numbers and polynomials involving the Bernoulli numbers and polynomials, the Stirling numbers, and the combinatorial numbers. We also give many remarks and observations on the interpolation functions for Apostol-type numbers and polynomials.

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Key Words and Phrases. Combinatorial numbers, Generating function, Bernoulli Numbers and polynomials, Stirling numbers, Interpolation function.

Introduction

Throughout this presentation, we use the following notations, definitions, and relations:

Let $\mathbb{N}$ denote the set of natural numbers and $\mathbb{N}_0 = \mathbb{N} \cup \{0\}$.

The Stirling numbers of second kind $S_2(n,k)$ are defined by the following generating function:

$$\frac{(e^t-1)^k}{k!} = \sum_{n=0}^{\infty} S_2(n,k)\frac{t^n}{n!}, \tag{1}$$

(*cf.* [2], [3], [5], [8]).

Let $k \in \mathbb{N}_0$. The Bernoulli polynomials $B_n^{(-k)}(x)$ of order $-k$ and degree n are defined by the following generating function:

$$\left(\frac{e^t-1}{t}\right)^k e^{xt} = \sum_{n=0}^{\infty} B_n^{(-k)}(x)\frac{t^n}{n!} \tag{2}$$

(*cf.* [1], [3], [8]).

The combinatorial numbers are defined by the following generating functions for $y_4(n,k;\lambda;a,b)$:

$$\sum_{n=0}^{\infty} y_4(n,k;\lambda;a,b)\frac{t^n}{n!} = \frac{e^{bkt}}{(a+b+1)^k}\left(e^{(a-b)t}+\lambda\right)^k. \tag{3}$$

(*cf.* [6]).

The beta-type rational functions $\mathfrak{M}_{j,m}(\lambda)$ are defined by the following formula:

$$\mathfrak{M}_{j,m}(\lambda) = \lambda^j(\lambda+1)^{m-j}. \tag{4}$$

(*cf.* [7]). The Beta polynomials form the basis of many polynomial families.

Main Results

Combining (3) with (4) we have the following formula:

Theorem 1. Let $k \in \mathbb{N}_0$. Then we have

$$\sum_{n=0}^{\infty} y_4(n,k;\lambda;0,0)\frac{t^n}{n!} = \mathfrak{M}_{0,k}(\lambda).$$

With the help of (2) and (3), we get the following theorem:

Theorem 2. Let $n \in \mathbb{N}_0$. Then we have

$$2^k y_4(n,k;-1;1,0) = (n)_k B_{n-k}^{(-k)},$$

where $(n)_k = n(n-1)\dots(n-k+1)$.

Combining (1) with (3) we have the following formula:

Theorem 3. Let $n \in \mathbb{N}_0$. Then we have

$$2^k y_4(n,k;-1;1,0) = k!\,S_2(n,k).$$

References

[1] L. Carlitz, *Some theorems on Bernoulli numbers of higher order*, Pac. Math. **2**(2), 127-139 (1952).
[2] G.-S. Cheon, J. S. Kim, *Factorial Stirling matrix and related combinatorial sequences*, Linear Algebra Appl. **357**, 247-258 (2002).
[3] L. Comtet, *Advanced Combinatorics*, (D. Reidel Publishing Company: Dordrecht, 1974).
[4] D. Gun and Y. Simsek, *Some new identities and inequalities for Bernoulli polynomials and numbers of higher order related to the Stirling and Catalan numbers*, Rev. R. Acad. Cienc. Exactas Fis. Nat. Ser. A Mat. RACSAM **114**, 1-12 (2020).
[5] Y. Simsek, *Generating functions for generalized Stirling type numbers, Array type polynomials, Eulerian type polynomials and their applications*, Fixed Point Theory Appl. **87**, 1-28 (2013).
[6] Y. Simsek, *Construction method for generating functions of special numbers and polynomials arising from analysis of new operators*, Math. Method. Appl. Sci. **41**, 6934-6954 (2018).
[7] Y. Simsek, *Beta-type polynomials and their generating functions*, Appl. Math. Comput. **254**, 172-182 (2015).
[8] H. M. Srivastava, *Some generalizations and basic (or q-) extensions of the Bernoulli, Euler and Genocchi polynomials*, Appl. Math. Inf. Sci. **5**, 390-444 (2011).

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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Formulas for Calculating Numerical Values of Combinatorial Sums Involving Apostol Bernoulli Numbers and Polynomials II

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Abstract. In this presentation, by applying PDEs for generating functions of the Apostol Bernoulli Numbers and Polynomials, some interesting and useful formulas for not only combinatorial sums, but also the Apostol Bernoulli Numbers and Polynomials are driven. Many remarks and observations on the combinatorial numbers, (Apostol type) Bernoulli Numbers and polynomials, the Stirling numbers, the Catalan numbers, and other special numbers and polynomials are also given.

2010 Mathematics Subject Classification. 05A15, 11B68, 11B83, 05A20.

Key Words and Phrases. Combinatorial numbers, Generating function, Bernoulli Numbers and polynomials, Stirling numbers, Catalan numbers.

Introduction

Special combinatorial numbers and polynomials, including combinatorial sums, are used in many areas of mathematics, as well as among the indispensable subjects of other applied sciences. It is well known that they are also used in the construction of many modeling and geometric structures. For this reason, we will briefly discuss these main areas discussed in this presentation. We plan to give researchers a new perspective as well as some new formulas.

In this presentation, the following notations, definitions, and relations are used:

Let $\mathbb{N}$ denote the set of naturel numbers and $\mathbb{N}_0 = \mathbb{N} \cup \{0\}$.

The Catalan numbers, C_n, are defined by

$$C_n = \frac{1}{n+1}\binom{2n}{n} \tag{1}$$

(*cf.* [4], [5], [6]).

The Stirling numbers of second kind $S_2(n,k)$ are given by:

$$\frac{(e^t-1)^k}{k!} = \sum_{n=0}^{\infty} S_2(n,k)\frac{t^n}{n!} \tag{2}$$

(*cf.* [2], [3], [6], [8]).

Let $k \in \mathbb{N}$. The Bernoulli numbers $B_n^{(-k)}$ of order -k and degree n are given by:

$$\left(\frac{e^t-1}{t}\right)^k = \sum_{n=0}^{\infty} B_n^{(-k)} \frac{t^n}{n!} \tag{3}$$

(*cf.* [1], [3], [8]).
The combinatorial numbers are defined by the following generating function for $y_1(n,k;\lambda)$:

$$\frac{(\lambda e^t+1)^k}{k!} = \sum_{n=0}^{\infty} y_1(n,k;\lambda) \frac{t^n}{n!}. \tag{4}$$

By using (2) and (4) we have the following known formula:

$$S_2(n,k) = (-1)^k y_1(n,k;-1). \tag{6}$$

(*cf.* [7]).

Combining (1) with (3), a relation between the Bernoulli numbers of negative order and the Stirling numbers of the second kind is given as follows:

$$S_2(2n,n) = (n+1)C_n B_n^{(-n)} \tag{7}$$

(*cf.* [4]).

Main Results

Combining (6) with (7) we have the following formula:

Theorem 1. Let $n \in \mathbb{N}$. Then we have

$$y_1(2n,n;-1) = (-1)^n (n+1) C_n B_n^{(-n)}.$$

With the help of (2) and (4), we get the following theorem:

Theorem 2. Let $n \in \mathbb{N}$. Then we have

$$y_1(n,k;-1) = (-1)^k \frac{k!}{2^n} \sum_{j=0}^{n} \binom{n}{j} S_2(n-j,k) y_1(j,k;1).$$

References

[1] L. Carlitz, *Some theorems on Bernoulli numbers of higher order*, Pac. Math. **2**(2), 127-139 (1952).
[2] G. S. Cheon, J.-S Kim, *Factorial Stirling matrix and related combinatorial sequences*, Linear Algebra Appl. **357**, 247-258 (2002).
[3] L. Comtet, *Advanced Combinatorics*, (D. Reidel Publishing Company: Dordrecht, 1974.)
[4] D. Gun and Y. Simsek, *Some new identities and inequalities for Bernoulli polynomials and numbers of higher order related to the Stirling and Catalan numbers*, Rev. R. Acad. Cienc. Exactas Fis. Nat. Ser. A Mat. RACSAM **114**, 1-12 (2020).
[5] S. Roman, *An Introduction to Catalan Numbers*, (Birkhauser: Boston, 2015).

[6] Y. Simsek, *Generating functions for generalized Stirling type numbers, Array type polynomials, Eulerian type polynomials and their applications*, Fixed Point Theory Appl. **87**, 1-28 (2013).

[7] Y. Simsek, *New families of special numbers for computing negative order Euler numbers and related numbers and polynomials*, Appl. Anal. Discret. Math. **12**, 1-35 (2018).

[8] H. M. Srivastava, *Some generalizations and basic (or q-) extensions of the Bernoulli, Euler and Genocchi polynomials*, Appl. Math. Inf. Sci. **5**, 390-444 (2011).

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Mathematical Modelling of Microwave Assisted Soxhlet Extraction of Fatty Acid Components from Prunus laurocerasus Fruit Grown in Turkey II

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Abstract. The aim of the study is to identity and classification its medicinal apply via analyzing the fatty acid components obtained from Prunus laurocerasus fruit grown in Turkey. A mixture of methanol:chloroform was used as the solvent. By applying the retention index from the Van den Dool and Kratz equation and evaluating chemical compositions of the fatty acid components are characterized by gas chromatography-mass spectrometry (GC–MS). The Van den Dool and Kratz equation results have the potential to be used not only in the fatty acid components, but also in applied mathematics and other fields [1]. In addition to we construct a new special finite sum. GC–MS analysis determined the fatty acid chemical composition, and there were 10 peaks identified in fatty acid composition of fruit. In this study, come up some vitally open problems involving Support Vector Machine (SVM), one of the commonly used machine learning algorithms developed for solving classification problems involving two-class or multiclass classification problems [1-4]. These problems may be used in some problems associated with the Van den Dool and Kratz equation associated with GC-MS. These; Is it also possible to classify chemical mixtures by this type a machine learning model? If such a machine learning method is to be used, how should feature vectors be chosen in order to classify compounds or chemical mixtures or other chemical oils? Can a new classification rule or a machine learning model be generated with the help of the RIs calculated for different classes of compounds?

2010 Mathematics Subject Classification. 00A69, 00A71, 11B83.

Key Words and Phrases. *Prunus laurocerasus*, Fatty Acids, Gas chromatography-mass spectrometry The Van den Dool and Kratz equation.

References

[1] Battaloglu, R; Calculation of retention indices of essential oils with the aid of the Van den Dool and Kratz equation and Bézier curves. Mathematical Methods in the Applied Sciences. (2021).
[2] Kucukoglu I, Simsek B, Simsek Y. Multidimensional Bernstein polynomials and Bezier curves: analysis of machine learning algorithm for facial expression recognition based on curvature. Appl Math Comput. 2019; 344:150-162.
[3] Simsek, B.; Yardimci, A. Using Bezier curves in medical applications. Filomat 2016, 30(4), 937-943.
[4] Simsek, Y. A new class of polynomials associated with Bernstein and beta polynomials. Mathematical Methods in the Applied Sciences 37(5), 676-685 (2014).

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On Convergence Properties of Fubini Type Polynomials II

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Abstract. In this study, we give a linear positive operator which including the generating functions of Fubini type polynomials. By using moment and central moments functions, we investigate convergence properties of operator such as Korovkin's theorem and modulus of continuity.

2010 Mathematics Subject Classification. 05A15, 11B83, 47B65.

Key Words and Phrases. Generating function, Linear positive operators, Fubini type polynomials.

Introduction

Kilar and Simsek constructed a new family for Fubini numbers and polynomials. By applying their generating functions, they studied fundamental properties such as recurrence relations and combinatorical sums [1]. The generating function of Fubini type polynomials are defined at the following equation:

$$\frac{2^l}{(2-e^l)^2}e^{xt}=\sum_{n=0}^{\infty}a_n^l(x)\frac{t^n}{n!}, \tag{1}$$

where $l \in \mathbb{N}_0$ and $|t|<ln2$ (*cf.* [1]-[3]).
By using Eq. (1), Kilar and Simsek gave a theorem with related to Fubini type polynomials as below:
Theorem 1. [1] For $l \in \mathbb{N}_0$,

$$a_n^l(x)=\sum_{k=0}^{n}\binom{n}{k}a_k^l\,x^{n-k}. \tag{2}$$

For $l=1$, we obtain some Fubini-type polynomials by applying Eq. (2) as follows:

$a_0(x)=2$
$a_1(x)=2x+4$
$a_2(x)=2x^2+8x+16$
$a_3(x)=2x^3+12x^2+48x+88$

Main Results

By the motivation Kilar and Simsek's works, we construct a linear positive operator by means of Fubini-type polynomials including its generating functions as follows:

Definition 2. [5] For $F_n>0$ and $k \in \mathbb{N}$, we have

$$F_n(f,x)=\frac{(2-e)^2}{2}e^{-nx}\sum_{k=0}^{\infty}\frac{a_k(nx)}{k!}f\left(\frac{k}{n}\right).$$

In this section, we give moment functions at the following lemma:

Lemma 3. For all $x \in [0,\infty)$ and $n \in \mathbb{N}$, we have

$$F_n(1,x) = 1$$
$$F_n(t,x) = x + \frac{1}{n}\frac{2e}{2-e}$$
$$F_n(t^2,x) = x^2 + \frac{-3e^2+4e+4}{(2-e)^2 n}x + \frac{8e-e^2}{(2-e)^2 n^2}.$$

References

[1] N. Kilar, Y. Simsek, *A new family of Fubini type numbers and polynomials associated with Apostol-Bernoulli numbers and polynomials*, Journal of the Korean Mathematical Society. **54** (5), 1605-1621, (2017).

[2] N. Kilar, Y. Simsek, *Identities and relations for Fubini type numbers and polynomials via generating functions and p-adic integral approach*, Publications de l'Institut Mathematique **106** (120), 113-123 (2019).

[3] N. Kilar, Y. Simsek, *Some relationships between Fubini type polynomials and other special numbers and polynomials*, AIP Conference Proceedings **2116** (1), 100017 (2019).

[4] R. Paltanea, *Approximation theory using positive linear operators*, Birkhauser Boston, 2004.

[5] E. Agyuz, *On Convergence Properties of Fubini Type Polynomials*, to appear in AIP Conference Proceedings.

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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A Note on Bernoulli and Euler Type Numbers and Polynomials II

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Abstract. In this work, we obtain some identities and theorems for Adjoint-Appell type numbers and polynomials with related to some numbers and polynomials.

2010 Mathematics Subject Classification. 05A15, 11B68, 11B83.

Key Words and Phrases. Generating function, Euler polynomials, Bernoulli polynomials.

Introduction

In 2019, the Adjoint-Euler numbers and polynomials and first kind Adjoint-Appell Bernoulli numbers and polynomials were defined by using the adjunction property to Sheffer polynomials. These polynomials are defined at the following equations:

$$\frac{e^t-1}{t}e^{xt}=\sum_{n=0}^{\infty}\overline{\beta_n}(x)\frac{t^n}{n!} \tag{1}$$

and

$$\frac{e^t+1}{2}e^{xt}=\sum_{n=0}^{\infty}\overline{\varepsilon_n}(x)\frac{t^n}{n!}, \tag{2}$$

where $\overline{\varepsilon_n}(x)$ and $\overline{\beta_n}(x)$, respectively, are called Adjoint-Appell Euler and Adjoint-Bernoulli polynomials of first kind. When $x=0$ in Eq. (1) and Eq. (2), $\overline{\varepsilon_n}(0):=\overline{\varepsilon_n}$ and $\overline{\beta_n}(0):=\overline{\beta_n}$, respectively, are called Adjoint-Appell Euler and Adjoint-Bernoulli numbers of first kind [1].

Main Results
In this section, we construct some properties between Adjoint-Appell Bernoulli polynomials and generalized array type polynomials.

Using Eq. (8) in [1], we get

$$\sum_{n=0}^{\infty}B_n^{-1}(x)\frac{t^n}{n!}=\sum_{n=0}^{\infty}\overline{\beta_n}(x)\frac{t^n}{n!}, \tag{3}$$

Using Eq. (30) in [3] for $\lambda=1, a=1, b=e, c=e$ and $\alpha=-1$, we have

$$\sum_{n=0}^{\infty}\mathcal{B}_n^{-1}(x;1;1,e,e)\frac{t^n}{n!}=\sum_{n=0}^{\infty}\overline{\beta_n}(x)\frac{t^n}{n!}, \tag{4}$$

Combining Eq. (4) with Theorem 6.3 in [3], we have

$$S_{k-1}^{n}(x+y;1,e;1)=\sum_{j=0}^{n}\frac{\binom{n}{j}\binom{n+k-1}{k-1}}{\binom{j+k}{k}}S_{k}^{j+k}(x;1,e;1)\bar{\beta}_{n}(y;1,1,e,e),$$

where $S_{v}^{n}(x;a,b;\lambda)$ is called generalized array type polynomials [3].

References

[1] P. Natalini, and P. E. Ricci, Adjoint Appell Euler and First Kind Appell Bernoulli Polynomials. Application and Applied Mathematics: An International Journal, 14 (2), 1112-1122, (2019).
[2] H. Ozden, Y. Simsek and H. M. Srivastava, A Unified Presentation of the Generating Functions of the Generalized Bernoulli, Euler and Genocchi Polynomials, Comput. Math. Appl., 60, 2779–2787 (2010).
[3] Y. Simsek, Generating Functions for Generalized Stirling Type Numbers, Array Type Polynomials, Eulerian Type polynomials and Their Applications, Fixed Point Theory Applications, 87, 343-355, (2013).
[4] Y. Simsek, A new Families of Special Numbers for Computing Negative Order Euler Numbers and Related Numbers and Polynomials, Appl. Anal. Discrete Math., 12, 1-35, (2018).
[5] Y. Simsek, Complete Sum of the Products of (h,q)- Extensions of Euler Polynomials and Numbers, Journal of Difference Equations and Applications. 16 (11), 1331-1348, (2010)
[6] N. Kilar, Y. Simsek, Computational formulas and Identities for New Classes of Hermite-based Milne-Thomson Type Polynomials: Analysis of Generating Functions with Euler's Formula, Math. Meth. Appl. Sci. 44, 6731-6762 (2021).

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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A Study on Order of Convergence of Generalized Chlodovsky-Szász Type Operators II

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Abstract. In this paper, we present a combination of Chlodovsky polynomials with generalized Jakimovski-Leviatan operators and give their approximation properties. Also using the usual modulus of continuity, we find a result for error estimate.

2010 Mathematics Subject Classification. 41A25, 41A36, 41A10

Key Words and Phrases. Jakimovski-Leviaten operators, Korovkin type convergence, Modulus of continuity.

Introduction

In 1969, [1], Jakimovski and Leviatan introduced an operator that contained both orthogonal polynomials and positive linear operators. They defined the Favard- Szász type operators using Appell polynomials. Let $g(z) = \sum_{n=0}^{\infty} a_n z^n$ an analytic function in the disk $|z| < r, r > 1$, $g(1 \neq 0)$. Appell polynomials $p_k(x)$, $k \geq 0$ can be given by

$$g(u)e^u = \sum_{k=0}^{\infty} p_k(x)u^k. \quad (1)$$

Let E be the set of functions of exponential type on $[0,\infty)$ with the property $|f(x)| \leq be^{ax}$ for some finite constants $a, b \geq 0$. The Jakimovski and Leviatan operator, $P_n: E \to C[0,\infty)$, is given by

$$P_n(f;x) = \frac{e^{-nx}}{g(1)} \sum_{k=0}^{\infty} p_k(nx) f\left(\frac{k}{u}\right) \quad (2)$$

Wood proved that the operators P_n are positive if and only if $\frac{a_1}{g(1)} \geq 0$, $(k = 0,1,..)$ in [2].

Many mathematicians have given various generalizations of Jakimovski- Leviatan operators.

In [3], Ciupa defined modified Jakimovski- Leviatan operators. In [4], Ciupa defined the polynomials p_k by

$$g(u)\cosh(ux) = \sum_{k=0}^{\infty} p_k(x)u^k, \quad (3)$$

where $\cosh x = \sum_{k=0}^{\infty} x^{2k}/(2k)!$ is the hyperbolic cosine of x and introduced the operator P_n, by the connection

$$P_n^*(f;x) = \frac{1}{g(1)\cosh(nx)} \sum_{k=0}^{\infty} p_k(nx) f\left(\frac{k}{n}\right) \quad (4)$$

Case 1. For $g(1) = 1$ in Eq. (3), one easily finds $p_{2k}(x) = \frac{x^{2k}}{(2k)!}$. In [5] authors studied this form in exponential weight spaces. *Case 2.* For $g(1) = \cosh(1)$ in Eq. (3), one gets the form $p_{2k}(x) = \frac{(1+x)^{2k}+(1-x)^{2k}}{2(2k)!}$ that was studied in [6].

Recently, Büyükyazıcı *et al*, [7] gave the following Chlodowsky [8] form of the Jakimovski Leviatan operators:

$$L_n(f;x)=\frac{e^{-\frac{n}{b_n}x}}{g(1)}\sum_{k=0}^{\infty}p_k\left(\frac{nx}{b_n}\right)f\left(\frac{k}{n}b_n\right),$$

where $\lim_{n\to\infty} b_n=\infty, \lim_{n\to\infty}\frac{b_n}{n}=0$, and p_k are Appell polynomials.

The papers [5] and [8] are the studies that we inspired and benefited from in this study. Let $C[0,\infty)$ be the set of all real-valued continuous functions on $[0,\infty)$. $C_E[0,\infty):=C[0,\infty)\cap E$. We consider the positive linear the operator

$$T_n(f;x)=\frac{1}{g(1)\cosh\left(\frac{nx}{b_n}\right)}\sum_{k=0}^{\infty}p_k\left(\frac{nx}{b_n}\right)f\left(\frac{k}{n}b_n\right) \quad (5)$$

First, we find the $T_n(1;x)$, $T_n(t;x)$, and $T_n(t^2;x)$ using the operator T_n. Next, we show that T_nf uniformly converges to f in every compact subinterval of $[0,\infty)$ using the Korovkin-type approximation. In addition, we estimate the T_nf- f with the help of the modulus of continuity.

Main Results

Lemma 1. From Eq. (3), we have the following:

$$T_n(1;x)=1, \qquad T_n(t;x)=x\tanh\left(\frac{n}{b_n}x\right)+\frac{b_n}{n}\frac{g'(1)}{g(1)},$$

$$T_n(t^2;x)=x^2+\frac{xb_n}{n}\tanh\left(\frac{n}{b_n}x\right)\frac{2g'(1)+g(1)}{g(1)}+\frac{b_n^2}{n^2}\frac{g''(1)+g'(1)}{g(1)},$$

where tanh*x* is the hyperbolic tangent of *x*.

Lemma 2. For all $\boldsymbol{n}\in\mathbb{N}$ we have

i. $T_n((t-x)^2;x)=\left(1-\tanh\left(\frac{n}{b_n}x\right)\right)\left(2x^2-\left(\frac{2g'(1)}{g(1)}+1\right)\frac{xb_n}{n}\right)$
$+\left(\frac{xb_n}{n}\right)+\left(\frac{b_n^2}{n^2}\right)\left(\frac{g''(1)+g'(1)}{g(1)}\right),$

ii. For each fixed point $x_0\in[0,\infty)$, we have $T_n((t-x)^2;x)\le x\left(\frac{3b_n}{n}\right)+\left(\frac{b_n^2}{n^2}\right)\left(\left(\frac{3g'(1)+g''(1)}{g(1)}\right)+1\right)$.

Theorem 1. If $f\in C_E[0,\infty)$, the operator T_n converges uniformly to *f* in each compact subset of $[0,\infty)$.

Theorem 2. Let $f\in C_E[0,\infty)$, then

$$|T_n(f;x)-f(x)|\le 2\omega(f;\delta),$$

where $\delta=\sqrt{T_n((t-x)^2;x)}$.

References

[1] A. Jakimovski and D. Leviatan, Generalized Szász operators for the approximation in the infinite interval, Mathematica (Cluj). 34, 97--103 (1969).
[2] B. Wood, Generalized Szász operators for approximation in the complex domain, SIAM J. Appl. Math. 17 (4), 790--801 (1969).
[3] A. Ciupa, Modified Jakimovski- Leviatan operators, Creative Math. &Inf. 16:13--9 (2007).
[4] A. Ciupa, A Voronovskaya-type theorem for a positive linear operator, International Journal of Mathematics and Mathematical Sciences. 2006 (2006).
[5] M. Lesniewicz and L. Rempulska, Approximation by some operators ofthe Szasz-Mirakjan type in exponential weight spaces, Glasnik Matematic˘ki, 32(52), 57–69 (1997).
[6] A. Ciupa, Approximation by a generalized Szász type operator, Journal of Computational Analysis and Applications. 5 (4), 413--424 (2003).
[7] İ. Büyükyazıcı, H. Tanberkan, S. K. Serenbay, Ç. Atakut, Approximation by Chlodowsky type Jakimovski--Leviatan operators, Journal of Computational and Applied Mathematics. 259, 153--163 (2014).
[8] I. Chlodowsky, Sur le développement des fonctions définies dans un intervalle infini en séries de polynomes de M.S. Bernstein, Compos. Math. 4, 380--393 (1937).

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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On Voronovskaya Type Result for Generalized Jakimovski-Leviatan Operators II

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Abstract. The aim of the paper is to present a Voronovskaya type theorem for Chlodovsky type Jakimovski-Leviatan operators defined in [3].

2010 Mathematics Subject Classification. 41A60, 41A36, 41A10, 41A25.

Key Words and Phrases. Jakimovski-Leviaten operators, Voronovskaya theorem.

Introduction

Büyükyazıcı *et al*, [1] gave the following Chlodowsky form of the Jakimovski Leviatan operators:

$$L_n(f;x)=\frac{e^{-\frac{n}{b_n}x}}{g(1)}\sum_{k=0}^{\infty}p_k\left(\frac{nx}{b_n}\right)f\left(\frac{k}{n}b_n\right), \qquad (1)$$

where $\lim_{n\to\infty}b_n=\infty,\lim_{n\to\infty}\frac{b_n}{n}=0$, and p_k are Appell polynomials: Let $g(z)=\sum_{n=0}^{\infty}a_nz^n\ (a_0\neq 0)$ be analytic functions in the disk $|z|<r, r>1$, $g(1\neq 0)$. The Appell polynomials $p_k=\sum_{i=0}^{k}a_i\frac{x^{k-i}}{(k-i)!}$ have generating functions of the form $g(u)e^u=\sum_{k=0}^{\infty}p_k(x)u^k$.

In [2], Ari and Serenbay defined a Kantorovich type of the operator (1) as follows

$$T_n(f;x)=\frac{b_n}{n}\frac{e^{-\frac{n}{b_n}x}}{g(1)}\sum_{k=0}^{\infty}p_k\left(\frac{nx}{b_n}\right)\int_{\frac{k}{n}b_n}^{\frac{k+1}{n}b_n}f(t)dt \qquad (2)$$

In [2], the authors obtained uniform convergence of the operators T_n on a compact subset of [0,∞) and established the rate of convergence with the help of various mathematical tools. In [3-6], the authors gave theVoronovskaya and Grüss-Voronovskaya results and inequalities for well-known positive operators.

In this paper, we give a Voronovskaya- type theorem for the operator T_n defined in [2].

Let $C[0,\infty)$ be the set of all real-valued continuous functions on $[0,\infty)$. $E:=\{f\in C[0,\infty):\forall x\in[0,\infty),|f(x)|\leq ce^{bx},c\in R,b\in R^+\}$ and $C_E[0,\infty):=C[0,\infty)\cap E$. For fixed $\in\mathbb{N}$ $C_E^r[0,\infty)=\{f\in C_E[0,\infty):f',f'',\dots,f^{(r)}\in C_E[0,\infty)\}$.

Main Results

Lemma 1. [4] For $x\in[0,\infty)$, we have $T_n(1;x)=1$, $T_n(t;x)=x+\frac{b_n}{n}\left(\frac{g'(1)}{g(1)}+\frac{1}{2}\right)$,

$$T_n(t^2;x) = x^2 + \frac{b_n}{n}\left(\frac{2g'(1)+2g(1)}{g(1)}\right)x + \frac{b_n^2}{n^2}\left(\frac{2g'(1)+g''(1)}{g(1)} + \frac{1}{3}\right).$$

Lemma 2. [4] For $x \in [0,\infty)$, we have

$$T_n(t-x;x) = \frac{b_n}{n}\left(\frac{g'(1)}{g(1)} + \frac{1}{2}\right) \text{ and } T_n((t-x)^2;x) = \frac{b_n}{n}x + \frac{b_n^2}{n^2}\left(\frac{2g'(1)+g''(1)}{g(1)} + \frac{1}{3}\right).$$

Theorem 1. [4] If f is continuous and bounded functions on $[0,\infty)$, then $\lim_{n\to\infty} T_n(f;x) = f(x)$ uniformly on $[0,a]$.

Lemma 3. From Eq. (3), we have the following

$$T_n(t^4;x) = x^4 + \frac{b_n}{n}\left(\frac{12g(1)+4g'(1)}{g(1)}\right)x^3 + \frac{b_n^2}{n^2}\left(\frac{24g(1)+36g'(1)+6g''(1)}{g(1)}\right)x^2$$
$$+ \frac{b_n^3}{n^3}\left(\frac{4g'''(1)+36g''(1)+48g'(1)+6g(1)}{g(1)}\right)x + \frac{3g'(1)+22g''(1)+10g'''(1)+g^{(4)}(1)}{g(1)} + \frac{1}{5}.$$

Lemma 4. For all $\boldsymbol{n} \in \mathbb{N}$ we have

$$T_n((t-x)^4;x) = \frac{b_n^2}{n^2}\left(\frac{4g'(1)}{g(1)} + 12\right)x^2 + \frac{b_n^3}{n^3}\left(\frac{14g''(1)+34g'(1)+5g(1)}{g(1)}\right)x$$
$$+ \frac{b_n^4}{n^4}\left(\frac{3g'(1)+22g''(1)+10g'''(1)+g^{(4)}(1)}{g(1)} + \frac{1}{5}\right).$$

Lemma 5. For the operators T_n, we have

$$\lim_{n\to\infty}\frac{n}{b_n}\left(T_n(t-x;x)\right) = \frac{g'(1)}{g(1)} + \frac{1}{2},\ \lim_{n\to\infty}\frac{n}{b_n}T_n((t-x)^2;x) = x,\ \frac{n^2}{b_n^2}T_n((t-x)^4;x) = \left(\frac{4g'(1)}{g(1)} + 12\right)x^2.$$

Theorem 2. Let $f \in C_E^2[0,\infty)$, then $\lim_{n\to\infty}\frac{n}{b_n}[T_n(f;x_0) - f(x_0)] = \left(\frac{g'(1)}{g(1)} + \frac{1}{2}\right)f'(x_0) + \frac{1}{2!}x_0 f''(x_0)$.

Proof. Let $x_0 \in [0,\infty)$ be a fixed point. By using the Taylor formula and linearity property of T_n, we get

$$\frac{n}{b_n}[T_n(f(t);x) - f(x)] = f'(x)\frac{n}{b_n}T_n(x-x_0;x) + \frac{n}{b_n}\frac{f''(x)}{2!}T_n((x-x_0)^2;x) + \frac{n}{b_n}T_n(p(x,x_0)(x-x_0)^2;x) \qquad (5)$$

We have $\frac{n}{b_n}T_n(p(t,x_0)(t-x_0)^2;x) \le \sqrt{\frac{n^2}{b_n^2}T_n((t-x_0)^4;x)T_n(p^2(t,x_0);x))}$ from the Cauchy-Schwarz inequality.

As $p^2(x_0,x_0) = 0$ and $p^2(.,x_0) \in C_E^2[0,\infty)$, we get $\lim_{n\to\infty}T_n(p^2(x,x_0);x) = p^2(x_0,x_0) = 0$. Considering Lemma 4 and the above facts, we get $\lim_{n\to\infty}\frac{n}{b_n}T_n(p(x,x_0)(x-x_0)^2;x) = 0$. Therefore taking the limit as $n\to\infty$ in (5), we obtain the desired result.

References

[1] İ. Büyükyazıcı, H. Tanberkan, S. K. Serenbay, Ç. Atakut, Approximation by Chlodowsky type Jakimovski--Leviatan operators, Journal of Computational and Applied Mathematics. 259, 153--163 (2014).
[2] D. A. Ari, and S. K. Serenbay, Approximation by a generalization of the Jakimovski-Leviatan operators, Filomat, 33(8), 2345-2353 (2019).
[3] A. Ciupa, A Voronovskaya-type theorem for a positive linear operator, International Journal of Mathematics and Mathematical Sciences. 2006 (2006).
[4] H.H. Gonska, G. Tachev, Grüss-type inequalities for positive linear operators with second order moduli, Matematicki Vesnik. 63 (4) ,247-252 (2011).
[5] A. M. Acu, H. Gonska and I. Raşa, Grüss-type and Ostrowski-type inequalities in approximation theory, Ukrainian Mathematical Journal. 63(6), 843-864 (2011).
[6] N. Cetin, VA. Radu, Approximation by generalized Bernstein-Stancu operators, Turkish Journal of Mathematics. 43(4), 2032-2048 (2019).

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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Some Results on Generalized Symmetric Bi-Jordan Derivation on Prime Rings II

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Abstract. In this work we define generalized symmetric bi-Jordan derivation as following:

Let R be an associative ring and $\delta: R \times R \to R$ be a symmetric bi-additive mapping if there is a symmetric bi-jordan derivation $D: R \times R \to R$ such that;

$$\delta(x^2, z) = xD(x, z) + \delta(x, z)x$$

for each $x, z \in R$ then δ is called generalized symmetric bi-jordan derivation and D is the relating symmetric bi-jordan derivation. Also, we investigate the algebraic properties of generalized symmetric bi-Jordan derivation.

2010 Mathematics Subject Classification. 16W20, 16W25, 16N60.

Key Words and Phrases. Symmetric Bi-Jordan Derivation, Generalized Symmetric Bi-Jordan Derivation, Prime Ring.

Introduction

Let R denote an associative ring with center $Z(R)$. Recall that R is prime if $aRb = 0$ implies $a = 0$ or $b = 0$. R is called semiprime $aRa = 0$ implies $a = 0$ If a ring R is said to be n-torsion free where n is an integer, if $nx = 0, x \in R$ implies $x = 0$ [6].

An additive mapping $d: R \to R$ is called a derivation if $d(xy) = d(x)y + xd(y)$ for all $x, y \in R$. d is called a Jordan derivation in case $d(x^2) = d(x)x + xd(x)$ for all $x \in R$ [1].

A mapping $D: R \times R \to R$ is called symmetric if the equality $D(x, y) = D(y, x)$ holds for all $x, y \in R$, and D is called bi- additive if D is additive in both arguments. Let D be a symmetric bi-additive mapping. A mapping $\tau: R \to R$ defined by $D(x, x) = \tau(x)$ is called the trace of D. Let D be a symmetric bi additive mapping. D is called symmetric bi derivation if the following equation $D(xy, z) = D(x, z)y + xD(y, z)$
holds for all $x, y, z \in R$.

I. N. Herstein in [5], defined the Jordan derivation on associative rings and proved that for prime rings of characteristic different from 2, a Jordan derivation is an ordinary derivation. After that, in 1988 M. Bresar and J. Vukman gave an alternative proof of the result in [2]. In [3], M. Bresar and J. Vukman defined left derivation from

a ring to a left R module X and they showed the existence of a nonzero Jordan left derivation of R into X implies R is commutative. The concept of a symmetric bi-derivation has been introduced by a number of authors. By the way in 1989, J. Vukman proved some results concerning symmetric bi derivations on prime and semiprime rings in [7]. Also Jordan derivations have application on functional identities.

Also in Y. Ceven and Z. Ciloglu's paper, [4], they introduced the Symmetric bi Jordan derivation as in the following:

$$D(xx,z) = D(x^2,z) = xD(x,z) + D(x,z)x$$

if there is a Jordan derivation such that;

$$f(xx) = f(x^2) = f(x)x + xd(x)$$

holds for all $x \in R$.

In this work, we give a generalization for symmetric bi-jordan derivations. We define generalized symmetric bi-jordan derivation and investigate algebraic properties of it.

Main Results

Theorem 1. Let R be prime ring with $Char\ R \neq 2$ and $\delta: R \times R \to R$ generalized symmetric bi-Jordan derivation and D is the relating symmetric bi-Jordan derivation on R. Then the following statements are hold for all $x, y, z \in R$:

(i) $\delta(xy + yx, z) = xD(y,z) + \delta(y,z)x + yD(x,z) + \delta(x,z)y$

(ii) $\delta(xyx, z) = xyD(x,z) + xD(y,z)x + \delta(x,z)yx$

(iii) $\delta(ayb + bya, z) = ayD(b,z) + byD(a,z) + aD(y,z)b + bD(y,z)a +$
$\delta(b,z)ya + \delta(a,z)yb$

References

[1] M. Bresar, Jordan Mappings of Semiprime Rings, Journal of Algebra, 218-228 (1989).
[2] M. Bresar and J. Vukman, Jordan Derivations on Prime Rings, Bull.of the Aus. Math. Soc.Vol.37, 321-322 (1988).
[3] M. Bresar and J. Vukman, On Left Derivations and Related Mappings, Proc. Amer. Math. Soc. Vol10, no:1, 7-16 (1990).
[4] Y. Ceven and Z. Ciloglu, On Symmetric Jordan and Jordan Left bi-derivations on Prime Rings, Afr.Mat.29, 689-698. (2018).
[5] I. N. Herstein, Jordan Derivations of Prime Rings, Proceedings of the Amer. Math. Soc, 8,1104-1110, (1957).
[6] I. N. Herstein, Topics in Ring Theory, Chicago Lectures in Mathematics, (1969).
[7] J. Vukman, Symmetric bi-derivations on Prime and Semiprime Rings, Aeques. Math. 38, 245-254, (1989).

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Notes on Fubini Type Numbers and Their Properties II

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Abstract. In this talk, we investigate and study on Fubini type numbers and polynomials and their generating functions. By virtue of the generating functions of these type numbers and polynomials, we give some results including special cases related to the Fubini type numbers and polynomials, the unified and modified presentation Fubini numbers and polynomials. These results have many applications not only in mathematics but also in physics, science and engineering.

2010 Mathematics Subject Classification. 05A15, 26C05, 33B10.

Key Words and Phrases. Fubini type numbers and polynomials, Generating function, Special numbers and polynomials.

Introduction

Throughout this talk, we use the following notations and definitions.

Let

$$\mathbb{N} = \{1,2,3,\dots\} \text{ and } \mathbb{N}_0 = \{0,1,2,3,\dots\},$$

and also $\mathbb{R}^+$ denotes the set of positive real numbers, $\mathbb{C}$ denotes the set of complex numbers (*cf.* [1-10]).

The Fubini type polynomials $a_n^{(d)}(x)$ of order d are defined by the exponential generating function:

$$\frac{2^d}{(2-e^t)^{2d}} e^{xt} = \sum_{n=0}^{\infty} a_n^{(d)}(x) \frac{t^n}{n!}, \tag{1}$$

where $d \in \mathbb{N}_0$ and $|t| < \ln(2)$ (*cf.* [6]; see also [2-5, 7, 8]).

The Fubini type numbers $a_n^{(d)}$ of order d are defined by the exponential generating function:

$$\frac{2^d}{(2-e^t)^{2d}} = \sum_{n=0}^{\infty} a_n^{(d)} \frac{t^n}{n!} \tag{2}$$

(*cf.* [6]; see also [2-5, 7, 8]).

Substituting $x = 0$ into (1), we have

$$a_n^{(d)}(0) = a_n^{(d)}.$$

Recently, in [8], Kilar and Simsek defined the unified and modified presentation Fubini polynomials of order d by the following generating function:

$$\frac{2^d}{(\mu b^t - \vartheta)^{2d}} c^{xt} = \sum_{n=0}^{\infty} \mathfrak{a}_n^{(d)}(x, \mu; \vartheta, b, c) \frac{t^n}{n!}, \tag{3}$$

where $b, c \in \mathbb{R}^+$ with $b, c \geq 1, \vartheta, \mu \in \mathbb{C}$ and $\mu \neq \vartheta$.

The unified and modified presentation Fubini numbers of order d are defined by means of the following generating function:

$$\frac{2^d}{(\mu b^t - \vartheta)^{2d}} = \sum_{n=0}^{\infty} \mathfrak{a}_n^{(d)}(\mu; \vartheta, b) \frac{t^n}{n!} \tag{4}$$

(*cf.* [8]).

When $x = 0$ into (3), we have

$$\mathfrak{a}_n^{(d)}(0, \mu; \vartheta, b, c) = \mathfrak{a}_n^{(d)}(\mu; \vartheta, b).$$

The unified and modified presentation Fubini numbers and polynomials of order d are related to many special numbers and polynomials. In particular, in this talk, we focus on examining some special cases of these numbers and polynomials.

Main Results

Here, by examining the generating functions of the unified and modified presentation Fubini numbers and polynomials, we give some results related to the Fubini type numbers and polynomials.

Putting $b = c = e$, $\mu = \frac{1}{2}$ and $\vartheta = 1$ into Equation (3), we have

$$\frac{2^d}{\left(\frac{1}{2}e^t - 1\right)^{2d}} e^{xt} = \sum_{n=0}^{\infty} \mathfrak{a}_n^{(d)}\left(x, \frac{1}{2}; 1, e, e\right) \frac{t^n}{n!}.$$

Combining the above equation with (1), we get

$$2^{2d} \sum_{n=0}^{\infty} a_n^{(d)}(x) \frac{t^n}{n!} = \sum_{n=0}^{\infty} \mathfrak{a}_n^{(d)}\left(x, \frac{1}{2}; 1, e, e\right) \frac{t^n}{n!}.$$

Comparing the coefficients of $\frac{t^n}{n!}$ on both sides of the above equation, we arrive at the following result:

Theorem 1. Let $n, d \in \mathbb{N}_0$. Then we have

$$a_n^{(d)}(x) = 2^{-2d} \mathfrak{a}_n^{(d)}\left(x, \frac{1}{2}; 1, e, e\right). \tag{5}$$

Corollary 2. As a special case, when $x = 0$ in (5), we have

$$a_n^{(d)} = 2^{-2d}\mathfrak{a}_n^{(d)}\left(\frac{1}{2};1,e\right).$$

References

[1] L. Comtet, *Advanced combinatorics*, D. Reidel Publication Company, Dordrecht-Holland/Boston-U.S.A., (1974).
[2] N. Kilar, *Fubini type numbers and their generating functions*, Akdeniz University, MSc Thesis in Mathematics, Antalya, (2017).
[3] N. Kilar, *Remarks and some formulas on Fubini type numbers and polynomials*, (In: Proceedings Book of the MICOPAM 2020-2021, The 3rd & 4th Mediterranean International Conference of Pure & Applied Mathematics and Related Areas (MICOPAM 2020-2021), (Ed. by Y. Simsek, M. Alkan, I. Kucukoglu and O. Öneş), ISBN: 978-625-00-0397-8, November 11-12, 2021, Antalya, Tukey, pp. 45-49).
[4] N. Kilar, *Combinatorial sums and identities associated with functional equations of generating functions for Fubini type polynomials*, GUJ Sci **36** (2), (2023).
[5] N. Kilar, *Formulas for Fubini type numbers and polynomials of negative higher order*, Montes Taurus J. Pure Appl. Math. **5** (3), 23–36 (2023).
[6] N. Kilar and Y. Simsek, *A new family of Fubini numbers and polynomials associated with Apostol-Bernoulli numbers and polynomials*, J. Korean Math. Soc. **54** (5), 1605-1621 (2017).
[7] N. Kilar and Y. Simsek, *Some relationships between Fubini type polynomials and other special numbers and polynomials*, AIP Conf. Proc. **2116** (1), 100017-1-100017-4 (2019).
[8] N. Kilar and Y. Simsek, *Families of unified and modified presentation Fubini numbers and polynomials*, Preprint.
[9] H. Ozden, Y. Simsek and H. M. Srivastava, *A unified presentation of the generating functions of the generalized Bernoulli, Euler and Genocchi polynomials*, Comput. Math. Appl. **60** (10), 2779-2787 (2010).
[10] Y. Simsek, *Generating functions for generalized Stirling type numbers, Array type polynomials, Eulerian type polynomials and their applications*, Fixed Point Theory Appl. **87**, 1-28 (2013).

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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Remarks on Combinatorial Numbers Containing Special Numbers and Polynomials II

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Abstract. In this presentation, we study on combinatorial numbers including finite sums of higher powers of binomial coefficients. By using generating functions techniques, some identities related to the combinatorial numbers and the Apostol Bernoulli numbers and polynomials are given. In addition, by applying the derivative operator to these numbers, a derivative formula that includes the special cases of combinatorial numbers is obtained.

2010 Mathematics Subject Classification. 05A15, 11B68, 26C05, 33B10.

Key Words and Phrases. Bernoulli numbers and polynomials, Combinatorial numbers, Generating function.

Introduction

The Apostol-Bernoulli polynomials, $\mathcal{B}_n(x;\lambda)$, are defined by

$$\frac{t}{\lambda e^t - 1} e^{xt} = \sum_{n=0}^{\infty} \mathcal{B}_n(x;\lambda) \frac{t^n}{n!}, \tag{1}$$

where $|t| < 2\pi$ when $\lambda = 1$; $|t| < \log(\lambda)$ when $\lambda \neq 1$ (*cf.* [1]-[8]). When $x = 0$ in (1), we have the Apostol-Bernoulli numbers

$$\mathcal{B}_n(0;\lambda) = \mathcal{B}_n(\lambda).$$

The numbers $y_6(m,n;\lambda,p)$ which are so-called combinatorial numbers, are defined by

$$y_6(m,n;\lambda,p) = \frac{1}{n!} \sum_{k=0}^{n} \binom{n}{k}^p k^m \lambda^k, \tag{2}$$

where $n, m, p \in \mathbb{N}_0 = \{0,1,2,3,\dots\}$ and λ is a real numbers or complex numbers (*cf.* [5]).

In [5], Simsek defined the ordinary generating function for the numbers $y_6(m,n;\lambda,p)$ as follows:

$$\mathcal{Z}(t;\lambda;p,m) = \sum_{n=0}^{\infty} y_6(m,n;\lambda,p) t^n. \tag{3}$$

In view of (2) and (3), for $m = p = 0$, the special case of the numbers $y_6(m, n; \lambda, p)$ is given by the following ordinary generating function:

$$\sum_{n=0}^{\infty} y_6(0, n; \lambda, 0)t^n = \frac{\lambda e^{\lambda t} - e^t}{\lambda - 1}, \tag{4}$$

where $\lambda \neq 1$ (*cf.* [5]).

Main Results

In this section, we give the main results of this presentation.

Theorem 1. Let n is a positive integer. Then we have

$$(n-1)! \sum_{j=0}^{n} \frac{(\lambda-1)^j \mathcal{B}_j(\lambda) y_6(0, n-j; \lambda, 0)}{j!} = 1.$$

Proof. In view of (4), we have

$$\frac{t(\lambda-1)}{(\lambda e^{(\lambda-1)t} - 1)} \sum_{n=0}^{\infty} y_6(0, n; \lambda, 0)t^n = te^t. \tag{5}$$

Combining the above equation with (1), when $x = 0$, we obtain

$$\sum_{n=0}^{\infty} (\lambda-1)^n \mathcal{B}_n(\lambda) \frac{t^n}{n!} \sum_{n=0}^{\infty} y_6(0, n; \lambda, 0)t^n = \sum_{n=0}^{\infty} \frac{t^{n+1}}{n!}.$$

After some calculations, then comparing the coefficients of t^n on both sides of the above equation, we arrive at the desired result.

By using (5) and (1), we can write,

$$\sum_{n=0}^{\infty} (\lambda-1)^n \mathcal{B}_n\left(\frac{1}{1-\lambda}; \lambda\right) \frac{t^n}{n!} \sum_{n=0}^{\infty} y_6(0, n; \lambda, 0)t^n = t.$$

After some calculations in the above equation, we arrive at the following theorem:

Theorem 2. Let n is a positive integer. Then we have

$$\sum_{j=0}^{n} \frac{(\lambda-1)^j}{j!} \mathcal{B}_j\left(\frac{1}{1-\lambda}; \lambda\right) y_6(0, n-j; \lambda, 0) = 0.$$

Theorem 3. Let $n \in \mathbb{N}_0$. Then we have

$$\frac{\partial}{\partial \lambda} y_6(0, n; \lambda, 0) = \frac{1}{n!}\left(\frac{1-\lambda^n}{(\lambda-1)^2} + \frac{n\lambda^n}{\lambda-1}\right).$$

Proof. By applying the derivative operator $\frac{\partial}{\partial \lambda}$ to Equation (4), we get

$$\sum_{n=0}^{\infty} \frac{\partial}{\partial \lambda} y_6(0, n; \lambda, 0)t^n = \frac{e^t - e^{\lambda t}}{(\lambda-1)^2} + \frac{t\lambda e^{\lambda t}}{\lambda-1}.$$

Thus

$$\sum_{n=0}^{\infty}\frac{\partial}{\partial\lambda}y_6(0,n;\lambda,0)t^n=\frac{1}{(\lambda-1)^2}\sum_{n=0}^{\infty}(1-\lambda^n)\frac{t^n}{n!}+\frac{\lambda}{\lambda-1}\sum_{n=0}^{\infty}\lambda^n\frac{t^{n+1}}{n!}.$$

Comparing the coefficients of t^n on both sides of the above equation, we arrive at the desired result.

References

[1] T. Apostol, *On the Lerch zeta function*, Pac. J. Math. **1**, 161-167 (1951).
[2] L. Comtet, *Advanced combinatorics*, D. Reidel Publication Company, Dordrecht-Holland/Boston-U.S.A., (1974).
[3] H. W. Gould, *Combinatorial numbers and associated identities: Table 1: Stirling numbers*, Volume 7, (Edited and Compiled by Jocelyn Quaintance), May 3, 2010.
[4] N. Kilar, *Certain finite sums pertaining to Leibnitz, Harmonic and other special numbers*, GU J Sci, Part A, **9**(3), 187-198 (2022).
[5] Y. Simsek, *Generating functions for finite sums involving higher powers of binomial coefficients: Analysis of hypergeometric functions including new families of polynomials and numbers*, J. Math. Anal. Appl. **477**, 1328-1352 (2019).
[6] Y. Simsek, *Identities and relations containing finite sums of powers of binomial coefficients*, AIP Conf. Proc. **2293**, 180002 (2020); https://doi.org/10.1063/5.0026604
[7] Y. Simsek, *Derivation of computational formulas for certain class of finite sums: Approach to generating functions arising from p-adic integrals and special functions*, Math Meth Appl Sci. (2022); https://doi.org/10.1002/mma.8321
[8] H. M. Srivastava, *Some generalizations and basic (or q-) extensions of the Bernoulli, Euler and Genocchi polynomials*, Appl. Math. Inf. Sci. 5(3), 390-444 (2011).

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Statistical Evaluation of Chemical Contents of Damlatas (Alanya/Antalya) Beach Sand II

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Abstract. The beaches, which have a very important position for the environmental ecosystem, also host millions of people every year. The sustainability of the chemical balance on the beaches, which are quite sensitive to natural or artificial (anthropogenic) pollutants, is important for the environment and human health. Damlatas beach, located within the borders of Alanya district of Antalya province, consists of fine pelagic sea sands in grain size. X-Ray Fluorescence Spectorometry (XRF) analysis was performed on four samples collected on the Damlatas coastline. According to the results obtained, the order of major oxide compositions and some important trace element compositions from largest to smallest is as follows in percentage; SiO_2 (81.07) > CaO (7.23) > Na_2O (5.07) > Al_2O_3 (2.72) > MgO (2.38) > Fe_2O_3 (0.47) > Zr (0.27) = K_2O (0.27) > Cl (0.12) > SO_3 (0.11) > TiO_2 (0.08) > Cr (0.018) > Sr (0.0038) > Sn (0.025) > Pb (0.0013) > Zn (0.0011) > Co (0.0010). According to the analyzed elements, the geological conditions in the region are highly influential on the chemical content of the beach sands. It is thought that the factors that increase the trace element concentrations may be the Upper Cretaceous aged ophiolitic rocks in the region. In this context, controlling the chemical content of the Damlatas beach area, which is important both for tourism and for the environment, will be necessary for sustainable conservation and use by making regular sampling and analysis.

2010 Mathematics Subject Classification. 62H10; 62H25; 62-07; 60E15; 62H11.

Key Words and Phrases. Beach sand, Statistical analysis, Chemical property, Alanya.

Introduction

The chemical contents of the pelagic sand sediments of different grading and colors forming the coastlines mostly depend on the composition of the geological layers in the region. However, soil and heavy metals can be transported down the valleys during the rainy season [1]. During transport, dissolution and precipitation processes, additives in the soil can affect beach sands [2-10]. It was determined that the majority of heavy metals in the sediment samples examined in the Trakya region of Turkey were of industrial and traffic origin [11]. In another study on beach sands in Algeria, anthropogenic and natural pollutants were tried to be separated from each other. It has been determined that anthropogenic pollutants originate from increased industrial activities [12]. Damlatas beach, which is approximately 140 km away from the center of Antalya, is located between Alanya castle and Cleopatra beach. In general, when the regional geology of Damlatas beach is examined, there are Quaternary alluviums, Upper Jurassic Lower Cretaceous dolomitic limestones and Upper Cretaceous ophiolitic rocks. In the literature, there is no study in which the chemical content of the sediment samples and natural/anthropogenic pollutants are discussed in the Damlatas beach area, where different geological rocks are located. In this context, the chemical analysis results of

the beach sand samples collected from the region were handled with the "descriptive statistics" method, which is one of the multivariate statistical analyses.

Discussion and Conclusion

The biogenetic source that creates 20% of the beach sands is calcium carbonate [1]. In this context, the major oxide composition of the Damlatas beach sands, which has the highest concentration after SiO_2, is the CaO. The arithmetic mean value is 7.23. The arithmetic mean, one of the central tendency measures of the major oxide and trace elemental compositions of the samples collected from Damlatas beach, which was determined as the study area; Standard deviation, maximum and minimum values, which are among the variability measures, were checked. The maximum and minimum values of the two highest major oxide values of Damlatas beach are as follows: SiO_2 (83.10-79.20); CaO (8.28-6.47). Arithmetic mean and standard deviation values of trace elements (Zr, Cr, Sr, Sn, Pb, Zn and Co) which are thought to originate from regional geology in Damlatas coast were checked. Except for Co, the mean values of Zr, Cr, Sr, Sn, Pb and Zn trace elements were found to be higher than the standard deviation values. In this context, the data group is normal and is distributed around the arithmetic mean. The non-normal distribution of Co element in different locations has been associated with the erosion and transport processes of different types of formations in the region.

References

[1] P. Gatt. *Controls on Plio-Quaternary foreland sedimentation in the Region of the Maltese Islands.* Bollettino- Societa Geologica Italiana 126, 119–129 (2007).
[2] A. Batista, V. Melo, R. Gilkes, M. Roberts. *Identification of Heavy Metals in Crystals of Sand and Silt Fractions of Soils by Scanning Electron Microscopy (SEM EDS/WD-EPMA).* Revista Brasileira de Ciência do Solo, 42, 0170174 (2018).
[3] O. Ozer Atakoglu, F. Yalcin. *Evaluation of the surface water and sediment quality in the Duger basin (Burdur, Turkey) using multivariate statistical analyses and identification of heavy metals.* Environmental Monitoring and Assessment, 194(7), 1-25, (2022).
[4] M. G. Yalcin, G. Simsek, S. B. Ocak, F.Yalcin, Y. Kalayci, M. Karaman. *Multivariate statistics and heavy metals contamination in beach sediments from the Sakarya Canyon, Turkey.* Asian Journal of Chemistry, 25(4) (2013).
[5] M. G. Yalcin, M. Setti, F. Karakaya, E. Sacchi, N. Ilbeyli, *Geochemical and mineralogical characteristics of beach sediments along the coast between Alanya and Silifke (southern Turkey).* Clay Minerals, 50(2), 233-248 (2015).
[6] M. G. Yalcin, D. G. Nyamsari, O. Ozer Atakoglu, F. Yalcin. *Chemical and statistical characterization of beach sand sediments: implication for natural and anthropogenic origin and paleo-environment.* International Journal of Environmental Science and Technology, 19(3), 1335-1356 (2022).
[7] O. Ozer, F. Yalcin, D. G. Nyamsari, M. G. Yalcin. *Appraisal of metal accumulation in beach sand using contamination indices and multivariate statistical analysis.* Proceedings Book of the 2nd Mediterranean, 32 (2019).
[8] F. Yalcin, M. P. Jonathan, M. G. Yalcin, S. Ilhan Y. Leventeli. *Investigation of heavy metal content in beach sediments on the of Tasucu bay (Mersin) with geochemical and multivariate statistical approaches.* Journal of Engineering Sciences and Design, 8(4), 1113-1125, (2020).
[9] M. G. Yalcin. *Heavy mineral distribution as related to environmental conditions for modern beach sediments from the Susanoglu (Atakent, Mersin, Turkey).* Environmental geology, 58(1), 119-129, (2009).
[10] F. Yalcin, D. G. Nyamsari, E. Paksu, M. G. Yalcin. *Statistical assessment of heavy metal distribution and contamination of beach sands of Antalya-Turkey: an approach to the multivariate analysis techniques.* Filomat, 30(4), 945-952, (2016).
[11] M. Coskun, E. Steinnes, M. Frontasyeva, T. Sjobakk, S. Demkina. *Heavy Metal Pollution of Surface Soil in the Thrace Region, Turkey*. Environ. Monit. Assess. 119, 545–556 (2006).
[12] M. Benhaddya, M. Hadjel. *Spatial distribution and contamination assessment of heavy metals in surface soils of Hassi Messaoud, Algeria.* Environ. Earth Sci. 71, 1473–1486 (2013).

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Identities on Higher Lerch Zetas Involving Polynomial Coefficients II

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Abstract. In this paper, we consider the higher Hurwitz-Lerch zeta. First, we study the polynomial coefficients and prove new identities. Second, we establish for them Multiplication formula and its Inversion. The multiplication formula involves polynomial coefficients. We also establish a new difference formula for the Hurwitz-Lerch zeta function. We are naturally applying the results to the higher order Apostol-Euler and Apostol-Bernoulli type polynomials.

2010 Mathematics Subject Classification. 11B68, 11B73.

Key Words and Phrases. Higher Hurwitz-Lerch zeta, Multiplication formula, polynomial coefficients, Apostol-Euler-Bernoulli polynomials.

References

[1] T.M. Apostol, *On the Lerch zeta function*, Pacific J.Math. 1 (1951), pp.161–167.
[2] T. M. Apostol, *Zeta and related functions, NIST handbook of mathematical functions* (edited by F. W. F. Olver, D. W. Lozier, R. F. Boisvert and C. W. Clark), 601–616, National Institute of Standards and Technology, Washington, DC, and Cambridge University Press, Cambridge, 2010. Available online in http://dlmf.nist.gov/25
[3] L. Carlitz, *Multiplication formulas for generalized Bernoulli and Euler polynomials*, Duke Math.J., Volume 27, No.4(1964), pp. 537-545.
[4] L. Comtet, *Advanced combinatorics*, Reidel (1974).
[5] A. Erdelyi, *Higher transcendental functions*, Vol 1, McGraw-Hill, New York, 1953.
[6] M. Garg, K. Jain, and H. M. Srivastava, *Some relationships between the generalized Apostol–Bernoulli polynomials and Hurwitz–Lerch Zeta functions*, Integral Transforms Spec. Funct. 17 (2006), pp. 803–815.
[7] S. Kanemitsu, M. Katsurada and M. Yoshimoto, *On the Hurwitz–Lerch zeta function*, Aequationes Math. 59 (2000), pp.1-19.
[8] Q-M. Luo, *Some formulas for Apostol–Euler polynomials associated with Hurwitz zeta function at rational arguments*, Appl. Anal. Discrete Math. 3 (2009), pp.336–346.
[9] T. Nakamura, *Some formulas related to Hurwitz–Lerch zeta functions*, Ramanujan Journal Vol. 21 (2010), No. 3, pp. 285–302.
[10] H.M. Srivastava, *Some formulas for the Bernoulli and Euler polynomials at rational arguments*. Math. Proc. Camb. Philos. Soc. 129 (1) (2000), pp. 77–84.

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Design and Production of the Composite Materials II

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Abstract. There are some scientific studies on the use of expanded perlite in the mixture for different purposes in construction materials. Lightweight composite materials could be obtained by using expanded perlite instead of aggregate, or it could be used in conventional composite materials by the replacement of the binder. In this study, the use of expanded perlite as an aggregate in the composite materials was investigated. Furthermore, the mechanical properties of these materials were determined. The main purpose of this study is to detect the relationship of the design of the composite mixtures with the mechanical properties.

Key Words and Phrases: Composite materials, Expanded perlite, Mathematical derivations, Optimization**.**

Introduction

The research for materials with high thermal insulation has increased with the implementation of Energy Identity Certificate, which has entered into force within the scope of energy efficiency and is mandatory in all buildings. For this reason, traditional organic materials are used instead of aggregates in cementitious composite materials. However, due to their low combustion resistance, studies are carried out on the use of materials such as inorganic expanded perlite, expanded vermiculite, expanded glass sphere. However, the composite materials with low thermal conductivity in the construction, it is necessary to show sufficient strength.

In this study, the mechanical properties of the cementitious composites containing expanded perlite aggregate were investigated. The experimental results obtained and similar experimental results in the literature were examined according to the design properties of composite materials.

Main Results

It is known that the substitution of expanded perlite aggregate (EPA) into composite materials as an aggregate makes the material lighter and reduces the thermal conductivity. However, some construction elements must also have particularly high strength. For this reason, scientific studies in which EPA used relatively low amounts of between 20-25% by volume were examined. The data obtained from the literature and the experimental data of this study obtained as a result of this study are given in Table 1.

Table 1: Some data of the composite materials

References	Water/binder ratio (w/b)	Amount of binder (kg/m^3)	The substitution ratio of EPA (%)	Compressive strength of the composite (MPa)
[1]	0.21	1060	25	97.00
In this study	0.35	400	20	35.14

[2]	0.47	430	20.8	51.56
[3]	0.48	337	20	17.30
[4]	1.11	200.8	20	10.95

The relationship between the compressive strength of composite materials and binder contents and quantities are given in Figures 1 and 2. As can be seen from these graphs, the relationship between the compressive strength and the amount of binder was closer and more linear.

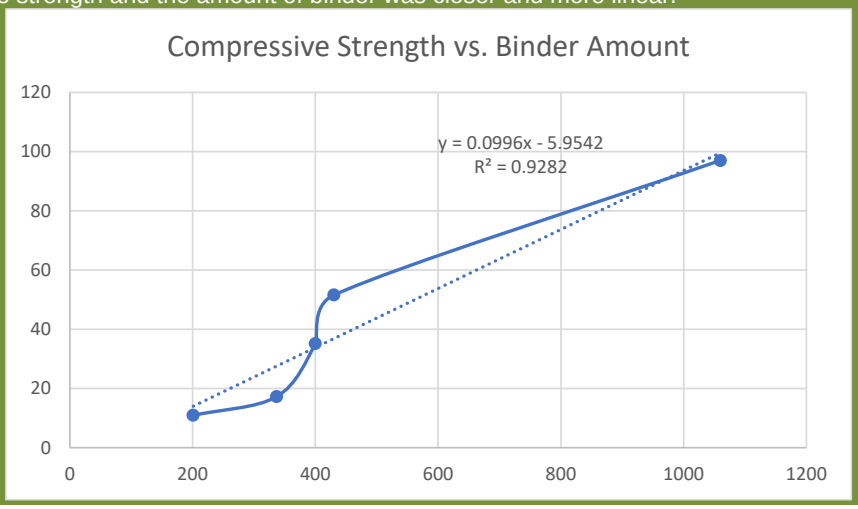


Figure 1: Relationship between compressive strength (MPa) and binder amount (kg/m^3)

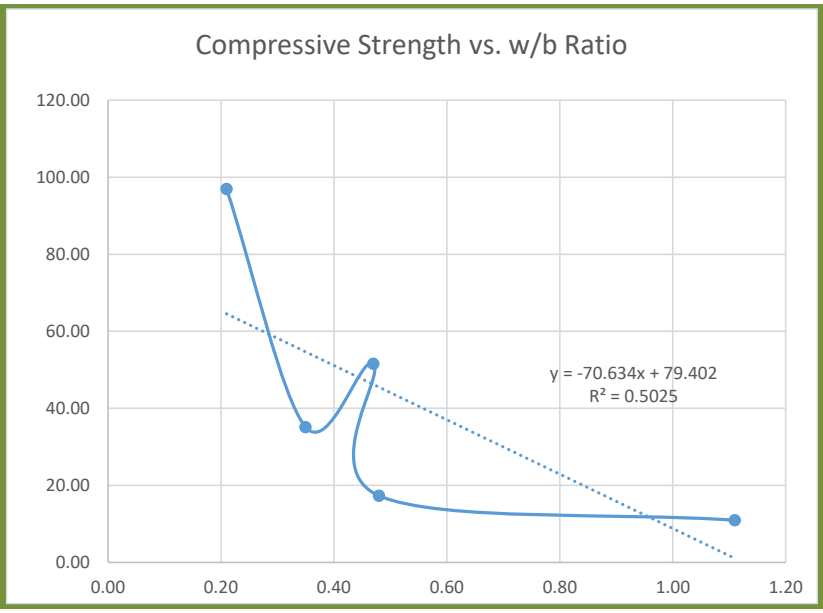


Figure 2: Relationship between compressive strength (MPa) and water/binder ratio.

References

[1] X., Wang, D., Wu, Q., Geng, D., Hou, M., Wang, L., Li, & Z., Sun, *Characterization of sustainable ultra -high performance concrete (UHPC) including expanded perlite*, Construction and Building Materials, **303** (124245), 1-13, (2021).

[2] A. S., Gandage, V. V., Rao, M. V. N., Sivakumar, A., Vasan, M., Venu, & A. B., Yaswanth, *Effect of perlite on thermal conductivity of self compacting concrete*, Procedia-Social and Behavioral Sciences, **104**, 188-197. (2013).

[3] O., Sengul, S., Azizi, F., Karaosmanoglu, & M. A. Tasdemir, *Effect of expanded perlite on the mechanical properties and thermal conductivity of lightweight concrete*, Energy and Buildings, **43** (2-3), 671-676, (2011).

[4] R., Demirboğa, İ., Örüng, & R., Gül, *Effects of expanded perlite aggregate and mineral admixtures on the compressive strength of low-density concretes*, Cement and Concrete Research, **31**(11), 1627-1632, (2001).

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Notes on Formulas for Apostol Type Numbers and Polynomials Derived from Partial Multiple Euler Type Zeta Function II

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Abstract. Throughout this presentation, a review is made on generalized zeta-type polynomials involving the Barnes' type multiple partial Euler Zeta Function and Apostol-type numbers and polynomials that they interpolate in negative integers. Some basic properties of these functions are be examined. With the help of these properties, the relationships between higher order Apostol type numbers and polynomials will be given. With the help of these relations, new formulas and identities will be given for the relation including the crosses of higher order Apostol-Euler numbers.

2010 Mathematics Subject Classification. 05A10, 11B65, 28B99, 11B68, 11M35.

Key Words and Phrases. Barnes' type multiple partial Euler zeta function, *q*-Euler numbers and polynomials, Apostol-Bernoulli numbers of higher order.

Introduction

The following function: For $Re(s) > 1$,

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s},$$

today known as the Riemann zeta function due to the German mathematician Bernhard Riemann (September 1826-20 July 1866), who was PhD student of Carl Friedrich Gauss, has also been earlier studied by Jacob Bernoulli (known as James or Jacques; 6 January 1655-16 August 1705), who was one of the many prominent mathematicians in the Bernoulli family, and Leonhard Euler (15 April 1707-18 September 1783), who was a Swiss mathematician, and etc. It is known that this function was defined by Riemann in 1859. Moreover, it is well known in number theory that it is an outstanding function that has an important place in number theory because of its relevance to the distribution of prime numbers. This function is also used in physics, probability theory, applied statistics, and other applied sciences (*cf.* [12]).

The Riemann zeta functions associated with many certain family of zeta-type functions such as the Airy zeta function, the Arakawa–Kaneko zeta function, the arithmetic zeta function, the Artin–Mazur zeta function of a

dynamical system, the Barnes zeta function or double zeta function, the Beurling zeta function of Beurling generalized primes, the Dedekind zeta function of a number field, the Duursma zeta function of error-correcting codes, the Epstein zeta function of a quadratic form, the Goss zeta function of a function field, the Hasse–Weil zeta function of a variety, the height zeta function of a variety, the Hurwitz zeta function, the generalization of the Riemann zeta function, the Igusa zeta function, the Ihara zeta function of a graph, the L-function, the twisted zeta function, the Lefschetz zeta function of a morphism, the Lerch zeta function, the Matsumoto zeta function, the Minakshisundaram–Pleijel zeta function of a Laplacian, the Motivic zeta function of a motive, the Multiple zeta function (Mordell–Tornheim zeta function of several variables), the p-adic zeta function of a p-adic number, the prime zeta function, the Ruelle zeta function, the Selberg zeta function of a Riemann surface, the Shimizu L-function, the Shintani zeta function, the Subgroup zeta function, the Witten zeta function of a Lie group, etc. (cf. [1-12]).

Conclusion

Recently, many different type of multiple Barnes zeta functions have been defined and investigated. Especially, by applying the Barnes' type partial multiple (h,q)-Euler Zeta Functions involving the multiple Hurwitz-Lerch Zeta function, we investigate computational formulas for the (h,q)-extension of Apostol type numbers and polynomials. Furthermore, how the general results obtained in this presentation are reduced to the previous results are discussed in detail. In addition, these results may be a source that will shed light on the studies of other researchers.

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References

[1] T. M. Apostol, On the Lerch zeta function, Pac. Asian J. Math. 1(2), 161--167 (1951).
[2] S-H. Rim, T. Kim, A note on q-Euler numbers associated with the basic q-zeta function, Appl. Math. Letters 20(4) (2007), 366-369.
[3] H. Ozden and Y. Simsek, A new extension of q-Euler numbers and polynomials related to their interpolation functions, Appl. Math. Letters 21 (2008) 934--939.
[4] H. Ozden, I. N. Cangul, and Y. Simsek, Multivariate Interpolation Functions of Higher-Order q-Euler Numbers and Their Applications, Abstract and Applied Analysis Volume 2008, Article ID 390857, 16 pages doi:10.1155/2008/390857
[5] I.N. Cangul, H. Ozden, and Y. Simsek, Generating functions of the (h,q)-extension of twisted Euler polynomials and numbers, Acta Math. Hungar., 120 (3) (2008), 281--299.
[6] Y. Simsek, D. Kim and S. -H. Rim, On the two-variable Dirichlet *q-L*-series, Adv. Stud. Contemp. Math. 10(2) (2005), 131--142.
[7] Y. Simsek, *q*-analogue of twisted *l*-series and *q*-twisted Euler numbers, J. Number Theory 110(2) (2005), 267--278.
[8] Y. Simsek, Twisted (h,q)-Bernoulli numbers and polynomials related to twisted (h,q)-zeta function and L-function, J. Math. Anal. Appl. 324 (2006), 790-804.
[9] Y. Simsek, Complete sum of products of (h,q)-extension of Euler polynomials and numbers, Journal of Difference Equations and Applications, 16(11), (2010), 1331--1348.
[10] H. M. Srivastava, T. Kim and Y. Simsek, *q*-Bernoulli numbers and polynomials associated with multiple *q*-zeta functions and basic L-series, Russian J. Math Phys. 12(2) (2005), 241-268.
[11] H. M. Srivastava, Ram K. Saxena, T. K. Pogany, Ravi Saxena, Integral and computational representations of the extended Hurwitz-Lerch zeta function, Integral Transforms Spec. Funct. 22(7) (2011), 487--506.
[12] H. M. Srivastava and J. Choi, Zeta and q-Zeta Functions and Associated Series and Integrals, Elsevier, Amsterdam, 2012.

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Derivation of Some Formulas for Stirling-type Numbers by *p*-adic Integration II

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Abstract. The main aim of this presentation is to derive some formulas for Stirling-type numbers by using the *p*-adic integration as a main technique. In general, the derived formulas in this study involve some kinds of special numbers and polynomials such as the Stirling and the Bernoulli numbers of the first kind, and the Daehee numbers. Lastly, we present a conclusion that contains some remarks and observations regarding our findings emerging from this study.

2010 Mathematics Subject Classification. 11B65, 11B68, 11B73, 11B83, 11S23, 11S80.

Key Words and Phrases. Stirling-type numbers, Bernoulli numbers, Finite sums, Combinatorial numbers, *p*-adic integral.

Introduction

In this presentation, we begin with reminding some notations and definitions regarding *p*-adic integration techniques as a main technique used in this study.

Let $\mathbb{Z}_p$ represent the set of *p*-adic integers and $g(x)$ be a uniformly differentiable function on $\mathbb{Z}_p$. Then, the bosonic *p*-adic integral (or the Volkenborn integral) of the function $g(x)$ is defined by

$$\int_{\mathbb{Z}_p} g(x)\, d\mu_1(x) = \lim_{N\to\infty} \frac{1}{p^N} \sum_{x=0}^{p^N-1} g(x)$$

where $\mu_1(x)$ denotes the Haar distribution given as

$$\mu_1(x) = \mu_1(x + p^N\mathbb{Z}_p) = \frac{1}{p^N}$$

on $\mathbb{Z}_p$ (*cf.* [10]; see also [5], [6], [7]).

By using the application of the bosonic *p*-adic integral to the falling factorial

$$(w)_n = w(w-1)\cdots(w-n+1)$$

and other types of polynomials, we derive some new identities, relations and finite sums involving Stirling-type numbers, the Bernoulli numbers, and some certain families of combinatorial numbers.

For the definitions of families of numbers and polynomials mentioned in this presentation, the interested readers may refer to the paper [1-12].

Conclusion

In this presentation, many finite sums and computational formulas have been obtained by applying the bosonic *p*-adic integral equations to the generalized factorial coefficients. Relationships of these coefficients with some combinatorial sums including Daehee numbers, especially Stirling numbers and Bernoulli numbers have been determined. Majority of the results of this study have a high potential to be addressed in applied fields such as mathematics, computational science and engineering.

References

[1] Ch. A. Charalambides, *Enumerative combinatorics*, (Chapman and Hall/CRC Press Company: London 2002).
[2] L. Comtet, *Advanced combinatorics: The art of finite and infinite expansions* (revised and enlarge edition), (D. Reidel Publishing Company: Dordrecht, Holland 1974).
[3] H. W. Gould and A. T. Hopper, *Operational formulas connected with two generalizations of Hermite polynomials*, Duke Math. J. **29**, 51-63 (1962).
[4] D. S. Kim and T. Kim, *Daehee numbers and polynomials*, Appl. Math. Sci. (Ruse) **7**(120), 5969-5976 (2013).
[5] T. Kim, *q-Volkenborn integration*, Russ. J. Math. Phys. **19**, 288-299 (2002).
[6] T. Kim, *q-Euler numbers and polynomials associated with p-adic q-integral and basic q-zeta function*, Trends Int. Math. Sci. Study **9**, 7-12 (2006).
[7] T. Kim, *An invariant p-adic q-integral on* $\mathbb{Z}_p$, Appl. Math. Lett. **21**, 105-108 (2008).
[8] I. Kucukoglu, *Formulas arising from p-adic integral of the generalized factorial coefficients*, Preprint.
[9] M. V. Koutras, *Eulerian numbers associated with sequences of polynomials*, Fibonacci Quart. **32**(1), 44-57 (1994).
[10] W. H. Schikhof, *Ultrametric Calculus: An Introduction to p-adic Analysis*, Cambridge Stud. Adv. Math. **4**, (Cambridge University Press: Cambridge 1984).
[11] Y. Simsek, *Explicit formulas for p-adic integrals: Approach to p-adic distributions and some families of special numbers and polynomials*, Montes Taurus J. Pure Appl. Math. **1**(1) (2019), 1-76; Article ID: MTJPAM-D-19-00005.
[12] H. M. Srivastava and J. Choi, *Zeta and q-zeta functions and associated series and integrals*, (Elsevier Science Publishers: Amsterdam, London and New York 2012).

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On the Sharp Constant in Inequalities of Hardy Type

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Abstract. We established the exact rate of convergence of the sharp constant in some inequalities of Hardy type.

Introduction

We investigate the sharp constant in inequalities of Hardy type.

In a series of papers Hardy [3, 4, 5] proved the classical inequality

$$\int_0^\infty \left(\frac{1}{x}\int_0^x f(t)\,dt\right)^p dx \le \left(\frac{p}{p-1}\right)^p \int_0^\infty f^p(x)\,dx,$$

for all $p > 1$ and non-negative $L_p(0,\infty)$-integrable function f, as well as the related discrete version

$$\sum_{k=1}^\infty \left(\frac{1}{k}\sum_{j=1}^k a_j\right)^p \le \left(\frac{p}{p-1}\right)^p \sum_{k=1}^\infty a_k^p,$$

for any ℓ_p-summable sequence of nonnegative numbers $\{a_k\}_{k=1}^\infty, p > 1$.

There are many results, concerning various modifications of these inequalities, see the monographs [6, 8] and the survey [7].

Here we study behaviour of the smallest possible constants $d_{a,b}$ and d_n in the inequalities of Hardy type, respectively

(i) $$\int_a^b \left(\frac{1}{x}\int_0^x f(t)\,dt\right)^2 dx \le d_{a,b}\int_0^\infty f^2(x)\,dx,$$

for functions f such that f^2 is integrable over interval (a,b), $0 < a < b < \infty$;

(ii) $$\sum_{k=1}^n \left(\frac{1}{k}\sum_{j=1}^k a_j\right)^2 \le d_n \sum_{k=1}^n a_k^2,$$

for finite sequences of real integers $\{a_k\}_{k=1}^n$, $a_k \ge 0$, $k = 1,\dots,n$.

Main Results

Our main results from [2] are summarized in the theorems below.

Theorem 1 *The best constant $d_{a,b}$ in Hardy's inequality (i) satisfies*

$$d_{a,b} \sim 4 - \frac{C}{\log^2(b/a)},$$

where C is a positive constant.

In [1] the authors proved the following two-sided estimation

$$4 - \frac{C_1}{\log n} \le d_n \le 4 - \frac{C_2}{\log^2 n},$$

with C_1, C_2 being absolute positive constants, but the exact rate of convergence in the limit $\lim_{n\to\infty} d_n = 4$ was not established. Later we fixed the exact rate in [2], namely:

Theorem 2 *The best constant d_n in Hardy's inequality (ii) satisfies*

$$d_n \sim 4 - \frac{C}{\log^2 n},$$

where C is a positive constant.

Both the proofs of Theorem 1 and Theorem 2 are constructive.

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References

[1] D. K. Dimitrov, I. Gadjev, G. Nikolov and R. Uluchev, Proc. Amer. Math. Soc. **140**, 2515–2529 (2021).
[2] D. K. Dimitrov, I. Gadjev, G. Nikolov and R. Uluchev, "Extremizing function and almost extremizing sequences for Hardy's inequalities", (manuscript).
[3] G. H. Hardy, Messenger Math. **48**, 107–112 (1919).
[4] G. H. Hardy, Math. Z. **6**, 314–317 (1920).
[5] G. H. Hardy, Messenger Math. **54**, 150–156 (1925).
[6] A. Kufner, L. Maligranda and L.-E. Person, Amer. Math. Monthly **113**, 715–732 (2006).
[7] A. Kufner, L. Maligranda and L.-E. Person, *The Hardy Inequality: About its History and Some Related results*, Vydavatelský servis, 2007.
[8] A. Kufner, L.-E. Person and N. Samko, *Weighted Inequalities of Hardy Type*, 2nd ed. World Scientific, Singapore, 2017.

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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A Note on Certain Classes of Finite Sums II

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Abstract. The purpose of this presentation is to study on the certain families of the finite sums involving harmonic numbers, sums of (inverse) binomial coefficients, and special numbers, etc. We present some identities for these sums. Finally, we also give some remarks and observations on these related sums.

2010 Mathematics Subject Classification. 05A15, 11B73, 11B83.

Key Words and Phrases. Generating function, hypergeometric function, binomial coefficients, Special numbers and polynomials, Combinatorial sums.

Introduction

Certain classes of finite sums have been used to solve real-world mathematical problems and models in mathematics and in applied sciences. The main motivation of this presentation is to study fundamental properties of the certain classes of finite combinatorial sums involving sums for powers of the (inverse) binomial coefficients and the harmonic numbers.

Let $m, n, p \in \mathbb{N}_0$, $\lambda \in \mathbb{C}$. The generating function for the following sums for powers of the binomial coefficients $y_6(m, n; \lambda; p)$:

$$y_6(m, n; \lambda; p) = \frac{1}{n!} \sum_{k=0}^{n} \binom{n}{k}^p k^m \lambda^k, \tag{1}$$

is given by the well-known generalized hypergeometric function (see, for details, [6]).

For $n, v, p \in \mathbb{N}_0$, $\lambda \in \mathbb{R}\,(or\ \mathbb{C})$, we constructed the following sums for powers of the inverse binomial coefficients:

$$S_v(n; \lambda, p) = \sum_{j=0}^{n} \frac{j^v}{\binom{n}{j}^p} \lambda^j, \tag{2}$$

(*cf.* [13]). For special values of n, λ, p, there are many different generating functions for the sum $S_v(n; \lambda; p)$ (*cf.* [2, p. 272]-[14]).

In [8], the rational sum

$$y(d,\lambda)=\sum_{k=0}^{d}\frac{(-1)^d}{(k+1)\lambda^{k+1}(\lambda-1)^{d+1-k}}, \tag{3}$$

is defined by means of the following generating functions:

$$\frac{\ln\left(1-\frac{\lambda-1}{\lambda}t\right)}{t(t-1)}=\sum_{m=0}^{\infty}(1-\lambda)^{m+2}\,y(m,\lambda)t^m, \tag{4}$$

where the principal branch of the logarithm is assumed to be taken; $\lambda\in\mathbb{R}\backslash\{0,1\}$, $t\in\mathbb{C}$ such that $0<|t|<1$ and $\left|\frac{(\lambda-1)t}{\lambda}\right|<1$ (*cf.* [11]).

The harmonic numbers H_n are defined by means of the following generating functions:

$$F_1(t)=\frac{\ln(1-t)}{t-1}=\sum_{n=1}^{\infty}H_n t^n, \tag{5}$$

where $H_0=0$ and $|t|<1$ (*cf.* [1]-[14]).

The alternating Harmonic numbers $\mathcal{H}_n$ are defined by means of the following generating functions:

$$F_2(t)=\frac{\ln(1+t)}{t-1}=\sum_{n=1}^{\infty}\mathcal{H}_n t^n, \tag{6}$$

where $|t|<1$ (*cf.* [3], [9], [12]).

Formulas for certain family of finite sums

We give some identities and relations for certain family of finites sums involving the sums $S_v(n;\lambda;p)$, $y(n,\lambda)$ and the (alternating) harmonic numbers.

$$S_1(2v;-1,1)=\frac{2v^2+2v+1}{v+1}, \tag{7}$$

where $v\in\mathbb{N}_0$ (*cf.* [13]).

We sum both sides of the previous novel formula for $S_1(2v;-1,1)$, from v to n, we obtain

$$H_{n+1}=\sum_{v=1}^{n}S_1(2v;-1,1)-n(n+2)$$

and

$$\sum_{v=1}^{n}(v+1)S_1(2v;-1,1)=\frac{n}{3}(2n^2+6n+4)$$

We also present many novel and interesting formulas and relations involving the combinatorial sums and others special numbers and polynomials.

Conclusion

In this presentation, we study on the rational sums $y(n,\lambda)$, $y_6(m,n;\lambda;p)$ and $S_v(n;\lambda,p)$ with their generating functions.

We try to solve partial solutions of open questions which were given by the author [6], [8].

Our future project is to give relations among the rational sums $y(n,\lambda)$, $y_6(m,n;\lambda;p)$, $S_v(n;\lambda,p)$ and special numbers and polynomials and also special combinatorial sums.

References

[1] H. Belbachir, M. Rahmani, and B. Sury, *Sums Involving Moments of Reciprocals of Binomial Coefficients*, J. Integer Seq **14**, Article 11.6.6 (2011).
[2] C. A. Charalambides, *Enumerative Combinatorics*, (Chapman \& Hall /CRC: Boca Raton, London New York, 2002).
[3] L. Comtet, *Advanced Combinatorics*, (D. Reidel Publication Company: Dordrecht-Holland/Boston-U.S.A. 1974).
[4] T. Mansour, *Combinatorial Identities and Inverse Binomial Coefficients*, Adv. Appl. Math. **28**, 196-202 (2002).
[5] T. J. Pla, *The sum of inverses of binomial coefficients revisited*, Fibonacci Quart., January 1997.
[6] Y. Simsek, *Generating functions for finite sums involving higher powers of binomial coefficients: Analysis of hypergeometric functions including new families of polynomials and numbers*, J. Math. Anal. Appl. **477**, 1328-1352 (2019).
[7] Y. Simsek, *Explicit formulas for p-adic integrals: Approach to p-adic distributions and some families of special numbers and polynomials*, Montes Taurus J. Pure Appl. Math. **1**(1), 1-76 (2019).
[8] Y. Simsek, *Interpolation functions for new classes special numbers and polynomials via applications of p-adic integrals and derivative operator*, Montes Taurus J. Pure Appl. Math. **3**(1), 1-24 (2021); Article ID: MTJPAM-D-20-00000.
[9] Y. Simsek, *New integral formulas and identities involving special numbers and functions derived from certain class of special combinatorial sums*, RACSAM **115** (66), (2021); https://doi.org/10.1007/s13398-021-01006-6.
[10] Y. Simsek, *Miscellaneous formulae for the certain class of combinatorial sums and special numbers*, Bull. Cl. Sci. Math. Nat. Sci. Math. **46** (2021), 151-167.
[11] Y. Simsek, *Derivation of Computational Formulas for certain class of finite sums: Approach to Generating functions arising from p-adic integrals and special functions*, To Appear in Math Meth Appl Sci., https://doi.org/10.1002/mma.8321.
[12] Y. Simsek, *Some Classes of Finite Sums Related to the Generalized Harmonic Functions and Special Numbers and Polynomials*, Montes Taurus J. Pure Appl. Math. **4**(3), 61-79 (2022).
[13] Y. Simsek, *Generating functions for series involving higher powers of inverse binomial coefficients and their applications*, Preprint.
[14] R. Sprugnoli, *Riordan Array Proofs of Identities in Gould's Book*, Dipartimento di Sistemi e Informatica Viale Morgagni, 65-Firenze (Italy) February 7, 2006.

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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On the Extreme Zeros of Jacobi Polynomials

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Abstract. We present new bounds for the extreme zeros of the Jacobi and, in particular, the Gegenbauer polynomials.

Introduction

The zeros of classical orthogonal polynomials have been a topic of intensive investigation. There are many reasons for this interest, such as the nice electrostatic interpretation of the zeros of the Jacobi, Laguerre and Hermite polynomials, their important role as nodes of Gaussian quadrature formulae, as well as the key role these zeros play in some extremal problems. We shall use the notation

$$x_{1n}(\alpha,\beta) < x_{2n}(\alpha,\beta) < \cdots < x_{nn}(\alpha,\beta)$$

for the zeros of the n-th Jacobi polynomial $P_n^{(\alpha,\beta)}$, $\alpha,\beta > -1$, and the zeros of the n-th Gegenbauer polynomial $P_n^{(\lambda)}$, $\lambda > -1/2$ are denoted by

$$x_{1n}(\lambda) < x_{2n}(\lambda) < \cdots < x_{nn}(\lambda).$$

This is a continuation of our work [9]. By applying the Euler-Rayleigh method to the Jacobi and, in particular, the Gegenbauer polynomials, represented as hypergeometric functions, we derive new bounds for their extreme zeros.

Main Results

The following statements have been proved in [9], they improve upon some results of Driver and Jordaan [2].

Theorem A ([9, Theorem 1.4]) *For every $n \geq 3$ and $\alpha, \beta > -1$, the largest zero $x_{nn}(\alpha,\beta)$ of the Jacobi polynomial $P_n^{(\alpha,\beta)}$ satisfies*

$$1 - x_{nn}(\alpha,\beta) < \frac{2(\alpha+1)(\alpha+3)}{(n+\alpha+1)(n+\alpha+\beta+1)\left[2 - \frac{(\alpha+1)(2n+\beta-1)}{(n+\alpha+1)(n+\alpha+\beta+1)-(\alpha+1)(\alpha+2)}\right]}.$$

Corollary A ([9, Corollary 1.6]) *For every $n \geq 3$ and $\lambda > -1/2$, the largest zero $x_{nn}(\lambda)$ of the Gegenbauer polynomial $P_n^{(\lambda)}$ satisfies*

$$1 - x_{nn}(\lambda) < \frac{(2\lambda+1)(2\lambda+5)}{(n+2\lambda)(2n+2\lambda+1)\left[2 - \frac{(2\lambda+1)(4n+2\lambda-3)}{2(n+2\lambda)(2n+2\lambda+1)-(2\lambda+1)(2\lambda+3)}\right]}.$$

Theorem B ([9, Theorem 1.1]) *For every $n \geq 3$ and $\lambda > -1/2$, the largest zero $x_{nn}(\lambda)$ of the Gegenbauer polynomial $P_n^{(\lambda)}$ satisfies*

$$1 - x_{nn}^2(\lambda) < \frac{(2\lambda+1)(2\lambda+5)}{2n(n+2\lambda)+2\lambda+1+\frac{2(\lambda+1)(2\lambda+1)^2(2\lambda+3)}{n(n+2\lambda)+2(2\lambda+1)(2\lambda+3)}}.$$

The above results provide lower bounds for the largest zeros of the Jacobi and Gegenbauer polynomials. It is instructive to compare Theorem B with the following upper bound for the largest zeros of the Gegenbauer polynomials:

Theorem C ([8, Lemma 3.5]) *For every $\lambda > -1/2$, the largest zero $x_{nn}(\lambda)$ of the Gegenbauer polynomial $P_n^{(\lambda)}$ satisfies*

$$1 - x_{nn}^2(\lambda) > \frac{(2\lambda+1)(2\lambda+9)}{4n(n+2\lambda)+(2\lambda+1)(2\lambda+5)}.$$

We observe that, for any fixed $\lambda > -1/2$ and large n, the ratio of the upper and the lower bound for $1 - x_{nn}^2(\lambda)$,

given by Theorems B and C, does not exceed 2.

By applying the Euler-Rayleigh method to the Jacobi polynomial $P_n^{(\alpha,\beta)}$, represented as a hypergeometric function,

we improve upon the lower bounds for the largest zeros of the Jacobi and Gegenbauer polynomials given in Theorems A, B and Corollary A. One of the results we prove is the following

Theorem D *For every $n \geq 4$ and $\lambda > -1/2$, the largest zero $x_{nn}(\lambda)$ of the Gegenbauer polynomial $P_n^{(\lambda)}$ satisfies*

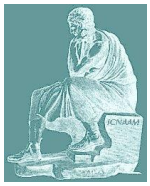
$$1 - x_{nn}(\lambda) < \frac{(2\lambda+1)(2\lambda+3)(2\lambda+7)}{(10\lambda+17)\left[n(n+2\lambda)+\frac{1}{8}(2\lambda+1)^2\right]}. \quad (1)$$

As a consequence of Theorem D, we can reduce the ratio of the upper and the lower bound for $1 - x_{nn}^2(\lambda)$ to 1.6.

As at some points the calculations become unwieldy, we have used the assistance of Wolfram Mathematica.

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References

[1] D. K. Dimitrov and G. P. Nikolov, J. Approx. Theory, 162, 1793–1804 (2010).
[2] K. Driver and K. Jordaan, J. Approx. Theory, 164, 1200–1204 (2012).
[3] D. P. Gupta and M. E. Muldoon, J. Ineq. Pure Appl. Math., 8(1), Article 24 (2007).
[4] M. E. H. Ismail and X. Li, Proc. Amer. Math. Soc., 115, 131–140 (1992).
[5] M. E. H. Ismail and M. E. Muldoon, Met. Appl. Math. Appl., 2, 1–21 (1995).
[6] I. Krasikov, J. Approx. Theory, 121, 287–291 (2003).
[7] I. Krasikov, J. Comp.Appl. Math., 193, 168–182 (2006).
[8] G. Nikolov, East J. Approx., 11, 147–168 (2005).
[9] G. Nikolov, Proc. Amer. Math. Soc., 147, 1541–1550 (2019).
[10] G. Nikolov and R. Uluchev, "Inequalities for real–root polynomials. Proof of a conjecture of Foster and Krasikov", in Approximation Theory: a Vlume Dedicated to Borislav Bojanov, edited by D. K. Dimitrov, G. Nikolov and R. Uluchev (Marin. Drinov Academic Publishing House, Sofia, 2004), pp. 201–216.
[11] G. Nikolov and R. Uluchev, "Bounds for the extreme zeros of Laguerre polynomials", in Numerical Methods and Applications. 9th International Conference, NMA2018 Borovets, Bulgaria, August 20–24, 2018, Lecture Notes in Computer Science 11189, edited by G. Nikolov, K. Georgiev and N. Kolkovska (Springer Nature Switzerland AG, 2019), pp. 243–250.
[12] G. Szegö, Orthogonal Polynomials, 4th edn. (AMS Colloquium Publications, Providence, RI, 1975).

SESSION #9: The 11th Symposium on Generating Functions of Special Numbers and Polynomials and their Applications (GFSNP 2022)

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Regression Analysis of Chemical Contents of Goynuk Stream (Antalya) Surface Waters II

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Abstract. Surface waters under natural conditions are important in terms of endemic animal and plant health. The chemical contents of the surface waters of Goynuk stream (Kemer, Antalya) were determined, in this study. The usage of the chemical analysis results in statistical analysis is very important. Therefore, regression analysis was performed and interpreted to measure the relationship between the chemical analysis results and the quantitative variable. The strongest and most positive correlation was found between Na and Sr, close to 0.926**, in the water samples taken from the study area.

2010 Mathematics Subject Classification: 62H10, 62H05

Keywords: Surface Water, Chemical Components, Regression Analysis, Goynuk Stream, Antalya.

Introduction

Antalya is one of the most important tourism cities of Turkey and is amazing with its nature and history. Due to its geological formations, it has a complex hydrological cycle and surface waters are effective in the diversity of flora and fauna. Goynuk Canyon is one of the important morphological structures. The chemical content of Göynük Stream also affects the natural life. The chemical analyzes of the surface water have been performed, for this purpose. There have been many studies emphasizing the importance of water in and around Antalya and trying to detect anomalies [1-5].

Discussion and Conclusion

Surface water affects the shaping of the natural habitat, as well as the activities of human being around the water, affects the chemistry of the water. Therefore, natural and anthropogenic conditions must be determined. The anomaly origin of the chemicals (anions and cations) and pollutants (heavy metal) should be determined. The regression analysis was performed and the relationship between the parameters was determined, in this study [6-11]. A strong positive correlation was indicated between Na-Ni (0.810**) and a very strong positive correlation between Na-Sr (0.926**) obtained from the water samples. The scatter diagrams were plotted for the two mathematical models.

References

[1] Leventeli, Y., & Yalcin, F. (2021). *Data analysis of heavy metal content in riverwater: multivariate statistical analysis and inequality expressions.* Journal of Inequalities and Applications, 2021(1), 1-22.

[2] Leventeli, Y., Yalcin, F., & Kilic, M. (2019). *An investigation about heavy metal pollution of Duden and Goksu Streams (Antalya, Turkey).* Applied Ecology and Environmental Research, 17(2).

[3] Yalcin, M. G., Aydin, O., & Elhatip, H. (2008). *Heavy metal contents and the water quality of Karasu Creek in Nigde, Turkey.* Environmental Monitoring and Assessment, 137(1), 169-178.

[4] Yalcin, M., Simsek, G., Bilge Ocak, S, Yalcin, F., Kalayci, Y., Karaman, M. (2013). *Multivariate statistics and heavy metals contamination in beach sediments from the Sakarya Canyon, Turkey.* Asian Journal of Chemistry, 25(4).

[5] Yalcin, F., Kilic, S., Nyamsari, D., Yalcin, M., & Kilic, M. (2016). *Principal component analysis of integrated metal concentrations of Bogacayi riverbank sediments in Turkey.* Polish Journal of Environmental Studies, 25(2).

[6] Aydin, B., Yalcin, F., Ozer Atakoglu, Ozge., Yalcin, M. (2020). *Regression analysis and statistical examination of Knoop hardness on abrasion resistance in Lyca beige marbles.* Filomat, 34(2).

[7] Draper, N. R., & Smith, H. (1998). Applied regression analysis (Vol. 326). John Wiley & Sons.

[8] Liang, K. Y., & Zeger, S. L. (1993). *Regression analysis for correlated data.* Annual Review of Public Health, 14(1), 43-68.

[9] Simeonov, V., Sarbu, C., Massart, D. L., & Tsakovski, S. (2001). *Danube River water data modelling by multivariate data analysis.* Microchimica Acta, 137(3), 243-248.

[10] Christensen, V. G., Jian, X., & Ziegler, A. C. (2000). *Regression analysis and real-time water-quality monitoring to estimate constituent concentrations, loads, and yields in the Little Arkansas River, south-central Kansas*, 1995-99 (No. 4126). US Department of the Interior, US Geological Survey.

[11] Halstead, J. A., Kliman, S., Berheide, C. W., Chaucer, A., & Cock-Esteb, A. (2014). *Urban stream syndrome in a small, lightly developed watershed: a statistical analysis of water chemistry parameters, land use patterns, and natural sources.* Environmental Monitoring and Assessment, 186(6), 3391-3414.