SCIENTIFIC PROGRAM
OF THE 48th INTERNATIONAL CONFERENCE
APPLICATIONS OF MATHEMATICS IN ENGINEERING AND ECONOMICS
SOZOPOL, JUNE 7-13, 2022

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June 8, 2022 (Wednesday)

9:00-10:00	Registration of the participants in the conference

10:00-10:30	Hall 1: OPENING

Hall 1: Bioinformatics
Chairperson: Desislava Ivanova

11:00-11:20	Plamenka Borovska, Desislava Ivanova, *Intelligent R&E Big OMICS Data and In Silico Knowledge Hub "Nova Paradigma"*
11:20-11:40	Veska Georgieva, Velimira Gardeva, *Adaptive algorithm for CT images enhancement to improve the diagnosis of lung diseases*
11:40-12:00	Ivan Koprinkov, *On the Mysterious Nature of Quantum Phenomena*

Hall 2: Fractional Calculus, Special Functions and Applications
Chairperson: Virginia Kiryakova

11:00-11:20	Virginia Kiryakova, *On the special functions of fractional calculus and their fractional multi-order integrals*
11:20-11:40	Shaher Momani, Iqbal Batiha, *A Mathematical Study on a Fractional-order COVID-19 Model*
11:40-12:00	Ivan Bazhlekov, Emilia Bazhlekova, *Fractional derivative modeling of a bioreaction process*

Coffee Break

12:20-12:40	Jordanka Paneva-Konovska, *On some estimates and asymptotic formulae in the class of multi-index Mittag-Leffler functions*
12:40-13:00	Fedotov E.D, *The Cauchy Problem for Some Systems of Equations in Partial Derivatives with the Caputo and Riemann-Liouville Derivative in Time*

Lunch Break

Hall 1: Bioinformatics
Chairperson: Desislava Ivanova

15:00-15:20   Boris Nenchovski, Desislava Ivanova, ***Big Data Bioinformatics Discoveries: Machine Learning approaches, tools and perspectives***

15:20-15:40   Ventsislav Kolev, Maria Marinova, ***Emilia Pardo, Optimal Global Sequence Alignments of Sars-CoV-2 Nucleotide Sequences using the Needleman-Wunsch Algorithm and Program Parallelization***

15:40-16:00   Zdravko Atanasov, Maria Marinova, Vasil Tsanov, ***RDI-MSA: Random Delete-Insert parallelized algorithm for MSA implemented on CUDA***

Coffee Break

16:20-16:40   Boryana Ilieva, Krasimira Prodanova, Vassil Sveshtarov, ***Prediction of Bisphosphonate-associated Osteonecrosis of the Jaws in Bulgarian Patients using Logistic Regression***

16:40-17:00   Stela Dimitrova, Simeon Tsvetanov, Teodor Boyadzhiev, Kiril Kirilov, ***A Modern Toolset for Multiple Sequence Alignment Based on Different Metaheuristic Methods***

17:00-17:20   Desislava Ivanova, J. Staeva, A. Shinkov, R. Kovacheva, ***Intelligent EU-TIRADS Classificator for Early Detection of Thyroid Anomalies using Deep learning Convolutional Neural Network***

Hall 2: Informatics and Software Sciences
Chairperson: Malinka Ivanova

15:00-15:20   Mariana Durcheva, Malinka Ivanova, ***Zero-Knowledge Protocol in Information Systems***

15:20-15:40   Plamen Spahiev, Desislava Ivanova, ***Overview and Study of the Modern Cyber Security Threats***

15:40-16:00   Dimitar Karastoyanov, Rosen Petrov, Milena Haralampieva, ***Innovative Technologies for Efficient Power Supply at Home and in Animal Husbandry Using Solar Systems and Phase-Change Materials***

16:00-16:20   Dimitar Karastoyanov, Krasimir Terziev, ***Use of Satellites for Observation of Plantations and Pastures in Agriculture***

Coffee Break

16:40-17:00   Victor Glavev, ***Integration of Document Management System with E-Government Payment System***

17:00-17:20   Dimitar Chalamov, Boris Zografov, Simeon Tsvetanov, ***Innovative Methods for Improving the Security in IOT Ecosystems***

17:20-17:40   Silvia Baeva, Nikola Nikolov, ***Creating a Website for Optimal Distribution of Investments of a High-Tech Company***

17:40-18:00   Roumiana Ilieva, Kiril Anguelov, Violeta Goleshevska, Nikola Gaydarov, ***Software Packages for Structural Equation Modeling***

18.30 Welcome Drinks

June 9, 2022 (Thursday)

Hall 1: Software Sciences and Innovation for Interactive Presentation of Bulgarian Cultural and Historical Heritage
Chairperson: Anna-Maria Totomanova

10:00-10:20	Anna-Maria Totomanova, ***Bulgarian Cultural Heritage in Digital Era***
10:20-10:40	Dimitar Iliev, Elina Boeva, ***From Stone to Screen: The Telamon Database of Ancient Inscriptions in Greek from Bulgaria***
10:40-11:00	Grigor Boykov, Hristo Hristozov**, *Data Extraction and Spatial Analysis of Arithmetic Population Densities, based on the Ottoman 18th-century Registers of Guarantors***
11:00-11:20	Desislava Ivanova, Daniel Mitev, ***Strategies for Organizing and Optimizing Different Types of Content for Interactive Accessible Web Portals***

Coffee Break

11:40-12:00	Alexander Petkov, ***An Integrated Web-based System with Geolocation for Objects of the Cultural and Historic Heritage***
12:00-12:20	Alexander Petkov, Iliya Karkamov, ***Performance Optimization of a Web Map Service Implementation in a Geographic Information System Using On-disk Cached Images***
12:20-12:40	Yoana Sirakova, Dimitar Iliev, ***A Bilingual Corpus of Latin Authors in Bulgarian Translation***
12:40-13:00	Maria Totomanova-Paneva, ***Histdict System: Digital Tools for Presenting and Processing Bulgarian Medieval Texts***
13:00-13:30	*Demonstration of Software Innovations for Interactive Presentation of Bulgarian Cultural and Historical Heritage*

Hall 2: Application in Predicting and Optimizing City Transport
Chairperson: Angel Marchev

10:00-10:20	Angel Marchev, ***SARIMAX with Fourier Terms for Predicting Travel Times for On-demand Public Transport in Sofia***
10:20-10:40	Krasimira Stoilova,Todor Stoilov, ***Urban Traffic Management***
10:40-11:00	Kaloyan Haralampiev, ***Application of Bayesian Fourier Model for Predicting Travel Times for On-demand Public Transport in Sofia***
11:00-11:20	Boyan Lomev, ***Application of ARIMA and VAR Models for Predicting Travel Times for On-demand Public Transport in Sofia***

Coffee Break

11:40-12:00	Kamen Spassov, ***Optimization of on-demand public transportation***
12:00-12:20	Boyan Lomev, Angel Marchev, ***Application of Neural Networks for Predicting Travel Times for On-demand Public Transport in Sofia***
12:20-12:40	Veneta Markovska, Stanimir Kabaivanov, ***Intelligent Algorithm to Calculate Economic Impact of Active Trasnportation Options***
12:40-13:00	Veneta Markovska, Stanimir Kabaivanov, ***Optimized City Traffic Analysis with Video Stream Inputs***

Lunch Break

Hall 1: Data Science
Chairperson: Desislava Ivanova & Myriam Maumy

15:00-15:20	Mina Daskalova, ***The Impact of Big Data on Management Control from Bulgarian Business Perspective***
15:20-15:40	Gergana Taneva, Stanimir Kabaivanov, ***Is SOFIX immune? COVID-19 impact on Bulgarian Stock Exchange***
15:40-16:00	Teodor Ukov, Georgi Tsochev, ***Application of Genetic Algorithms in a Multiplayer Video Game for Personal Qualities Training***
16:20-16:40	Keshav Nath, Aman Ahuja, Twarit Shah, Aakanksha Gupta, Rahul Katarya, ***Socialympics - Sentiment Analysis of Tweets about the Tokyo Olympics 2021 using Machine Learning and Deep Learning Approaches***

Coffee Break

17:00-17:20	Simeon Tsvetanov, Teodor Boyadzhiev, Stela Dimitrova, ***Software Architecture and Methodology for Intensive Data Science Experiments***
17:20-17:40	Malinka Ivanova, Anna Rozeva, Stefan Stoyanov, ***Ensemble Machine Learning Algorithms for Analysis of Noise Characteristics in Electronic Circuits***
17:40-18:00	Elizaveta Logosha, Myriam Maumy, Frederic Bertrand, ***Deriving Confidence Intervals for Selling a Fraction of a Stock Using Discrete Event Simulation Techniques***

Hall 2: E-Learning
Chairperson: Daniela Bimova

15:00-15:20	Vanya Ivanova, Hristina Kulina, ***Investigation of correlations between students' knowledge of English and its practical application by using language tests and the machine learning approach***
15:20-15:40	Daniela Bímová, Jiří Břehovský, ***Not only virtual models of helicoidal surfaces***
15:40-16:00	Fabien Kunis, Maya Gaydarova, ***Improving collaborative problem-solving competency through information systems in physics education***

Coffee Break

16:20-16:40	Neli Sirakova, Nikolaj Sirakov, ***Diagnosis and assessment of the motivation and mathematical competence of students majoring in systems programming***
16:40-17:00	Nikolay Hinov, Dimitar Vakovsky, Bogdan Gilev, ***Matlab-based automated design of resonant DC-AC converter***

June 10, 2022 (Friday)

Hall 1: Data Science
Chairperson: Desislava Ivanova & Myriam Maumy

10:00-10:20	Tamara Dieter, Andreas Weinmann, Eva Brucherseifer, *Synthetic Data for Drone Detection*
10:20-10:40	Zhenli Lu, Roumiana Ilieva, Malinka Ivanova, *Machine Learning for Performance Measurement of Robot-Assisted Cerebral Palsy Rehabilitation Training System*
10:40-11:00	Alexander Rusev, Maksim Sharabov, Georgi Tsochev, Roumen Trifonov, *Artificial intelligence methods suitable for Lateral Movement detection*
11:00-11:20	Vladimir D. Tonchev, *Coding Theory, Finite Geometry, and Combinatorial Designs*

Coffee Break

11:40-12:00	Stoyan Popov, Simona Kancheva, *Applying game theory to decision making in risky investments*
12:00-12:20	Stoyan Popov, Svetoslav Karamukov, *Model-based optimization of planned consumption of household electricity purchased from the free market*
12:20-12:40	Stoyan Popov, Borislav Krumov, *Optimal electronic devices selection using theory of cooperative games*

Hall 2: Mathematical Analysis and Applications
Chairperson: Teodora Zapryanova

10:00-10:20	Teodora Zapryanova, *On the Iterates of discretized versions of Cao-Gonska operators*
10:20-10:40	Vladimir Todorov, *Some applications of analytic vector functions*
10:40-11:00	Miroslav Stoenchev, *Classical Symmetric Diophantine Systems*
11:00-11:20	Todor Stoilov, Krasimira Stoilova, *Credit Management by Inventory Modeling*

Coffee Break

11:40-12:00	George Popov, Antoaneta Popova, Milena Popova, *Analytical Model of the Displacement of the Delta variant of Covid-19 by Omicron*
12:00-12:20	Vesselin Nenkov, Asen Velchev, *Formulas for the distances from the intersection points of the perpendicular bisectors of the opposite sides and the intersection of the perpendicular bisectors of the diagonals to the vertices of the quadrilateral, to its Brocard points and to its point of Mikel*
12:20-12:40	Vesselin Nenkov, Asen Velchev, *Configuration of pedal circles with respect to an arbitrary point in the plane of a polygon /Continuation/*

12:40-13:00	Vesselin Nenkov, Asen Velchev, ***Two mappings of four points in the plane of a given triangle and the generated transformations of landmarks by them***

Lunch Break

Hall 2: Data Science
Chairperson: Desislava Ivanova & Myriam Maumy

15:00-15:20	Angel Ninov, Simona Keskinova, ***Reinforcement learning approach for mate selection in animal breeding***
15:20-15:40	Zlatko Zahariev, ***Fuzzy Relational Equations and Inequalities - Min-Lukasiewicz implication***
15:40-16:00	Zlatko Zahariev, ***Software for solving Fuzzy Relational Equations in various algebras***

Coffee Break

16:20-16:40	Nikolay Hinov, Mirjana Kocaleva, Zoran Zlatev, ***Design consideration of Boost DC-DC converter through machine learning***
16:40-17:00	Vladimir Yordanov, ***Unemployment and Income Inequality Effects on Adults' Mental Health based on the COVID-19 Crisis***
17:00-17:20	Zlatina Tzenova, ***Analysis of the Financial Condition of a Company***

Hall 2: Numerical Methods
Chairperson: Jiri Hozman

15:00-15:20	Jiri Hozman, Tomas Tichy, ***DG Method for Valuation of Two-Stage Expansion Options***
15:20-15:40	Thomas März, Vladyslav Gapyak, Andreas Weinmann, ***A two-stage Model-Based Regularized Reconstruction Approach for Magnetic Particle Imaging***
15:40-16:00	Petr Salač, ***Numerical results for the cooling silver core optimization problem***
16:00-16:20	Meglena Lazarova, Svetoslav Markov, Neli Sirakova, ***Growth Functions of Logistic Type***

Coffee Break

16:40-17:00	Khristo Tarnev, Rositsa Andreeva, ***Two-dimensional Monte Carlo model of a virus spread***
17:00-17:20	Silvia Baeva, Ivelina Hinova, ***Energy Load Profiles for Energy Analysis and Combined Energy Sources***
17:20-17:40	Lyudmila Ivanova, Silvia Baeva, Fatima Sapundzhi, Meglena Lazarova, ***An Analysis of Seasonal Fluctuations and Forecasting of Some Production Capacities Generated by PV Power Station***
17:40-18:00	Aleksandar Svinarov, Silvia Baeva, ***Mathematical Model and Mobile Application to Support Decision-Making in Conditions of Uncertainty when Investing in Terrains for Construction of Renewable Energy Sources***

20:00 Official Dinner

June 11, 2022 (Saturday)

Hall 2: Differential Equations
Chairperson: Nedyu Popivanov

13:00-13:20	Nedyu Popivanov, Evgeny Moiseev, Yani Boshev, *Nonexistence results for some nonlinear mixed type equations in two dimensions*
13:20-13:40	Ekaterina Madamlieva, *An integral representation of the solutions of fractional system with distributed delay*
13:40-14:00	Tsvetan Hristov, Nedyu Popivanov, Rudolf Scherer, *Singular solutions of 3-D protter-morawetz problem for weakly-hyperbolic equations of tricomi type*

Coffee Break

14:20-14:40	Todor Popov, *Analysis of singularities of solutions to Protter problems for the wave equation*
14:40-15:00	Mirko Tarulli, George Venkov, *Dynamics of the solution to the fourth-order NLS on the waveguides $R^d \times T^k$*

Hall 2: PhD Session: Applied Mathematics, Big Data and Artificial Intelligence
Chairperson: Stoyan Popov

15:40-16:00	Desislava Ivanova, Veronika Metodieva, *Business Process Mining: Algorithm Analysis, Software Tools, Challenges and Perspectives*
16:00-16:20	Marie Njaime, Charbel Chahla, Hichem Snoussi, Fahed Abdallah, *Adversarial AutoEncoder with Attention Driven Loss*
16:20-16:40	Venelin Todorov, Slavi Georgiev, Ivan Dimov, *An Improved Stochastic Algorithms for Multidimensional Air Pollution Modelling*

Coffee Break

17:00-17:20	Stefan Iliev, Stefan Parvanov, Stanislava Stoilova, *Solution of the problem regarding the optimal number and location of the specialized services dedicated to the maintenance and repair of firefighting vehicles in MOI*
17:40-18:00	Antoaneta Popova, Kalina Semova, *Application of the Multifactor Quantitative Method for Determination of Customs Value of Goods*

June 12, 2017 (Sunday)

Hall 1: Mathematical Modeling and Experiment in Physics
Chairperson: Khristo Tarnev

10:00-10:20	Khristo Tarnev, Elena Halova, **Algorithm for demonstration of transport processes in gases for physics education**
10:20-10:40	Radostina Tasheva, Ivan Stefanov, *Estimation of the mass and the spin of the neutron star 4U 1728-34 using triples of X-ray quasi-periodic oscillations*
10:40-11:00	Todor N. Arabadzhiev, Ivan M. Uzunov, *The influence of the saturation of the nonlinear gain on the Raman stationary solutions of the complex cubic–quintic Ginzburg–Landau equation*

Coffee Break

11:20-11:40	R.G. Kobilarov, *Determination of primordial radionuclides elemental concentrations in surface soils in the central Balkan national park*
11:40-12:00	R. G. Kobilarov, *Comparison of the risk to human health from ionizing and non-ionizing radiation*

Hall 2: Numerical Methods
Chairperson: Dana Černá

10:00-10:20	Dana Černá, *Orthogonal spline-wavelet method for two-asset Black-Scholes and Merton model*
10:20-10:40	Yanko Slavchev, *Computer Analysis of the Girder Response of Single Girder Bridge Cranes under Moving Loads*
10:40-11:00	Kristina Pavlova, Stanislav Dimitov, *Determining the optimal composition of feed mixtures in a cow farm, using a mathematical model*
11:00-11:20	Kristina Pavlova, Creating a transport plan using bilevel optimization for the town of Sozopol

Coffee Break

11:40-12:00	Mihail Konstantinov, Petko Petkov, *Essays on finite arithmetic*
12:00-12:20	Todor Zhelyazov, Sergey Pshenichnov, *Propagation of waves provoked by an impact load in a viscoelastic cylinder*
12:20-12:40	Jordan Genoff, *Extreme Floating-Point Computation: Part I – A Case of Heuristic Rounding*

Lunch Break

Hall 1: Mathematical Modeling and Experiment in Physics
Chairperson: Khristo Tarnev

15:00-15:20	Kamen Perev, **Analytic approximation of nonlinearities with memory**
15:20-15:40	Mariam Shehadi, Stefan Karatodorov, Lyubomir Stoychev, Georgi Yankov, Docho Tsankov, Boris Shivachev, Todor Petrov, *Femtosecond Z-scan measurement of nonlinear optical characteristics of wide bandgap semiconductors materials GaN and AlN with applications in optoelectronics*
15:40-16:00	Dimitar Nenov, Radostina Tasheva, Diana Zlatanova, *To be or not to be – deterministic factors in deductive thermal modeling for predicting vulture flight*

Coffee Break

16:20-16:40	Magdalena D. Christova, Milan S. Dimitrijević, Nenad Milovanović, Sylvie Sahal-Bréchot, *Stark broadening parameters of spectral lines of singly ionized zinc atom*
16:40-17:00	Jordan Genoff, *Trajectory Divergence Measures*

Hall 2: Numerical Methods
Chairperson: Aleksey Nikolov

15:00-15:20	Valentin Mateev, Iliana Marinova, *Fluid Flow Diffusion Modeling with Convolutional Neural Network aided Method*
15:20-15:40	Valentin Mateev, Iliana Marinova, *Modified chromosome pooling genetic algorithm for resource allocation optimization*
15:40-16:00	Dimitar Arnaudov, *Modelling of Multiphase Converter for Energy Storage System*

Coffee Break

16:20-16:40	Zornitza Petrova, Ivan Altaparmakov, *On the distributions of the zeros of some integrals and applications - part 1*
16:40-17:00	Bogdan Gilev, Nikolaj Hinov, *Control of bidirectional DC-DC converter with model reference neural controller*
17:00-17:20	Yonko Stoynov, *Fundamental solution for functionally graded Magnetoelectroelastic plane*