



SCIENTIFIC PROGRAM

**New Trends in the Applications of Differential Equations in
Sciences (NTADES'23)**

**17-20 July, 2023, St. Constantine and Helena
Bulgaria**



Monday, July 17th

- 09:00–9:30 **REGISTRATION AND OPENING**
- 9:30-13:00 **ISRAELI-BULGARIAN WORKSHOP**
Chair: Angela Slavova
- 9:30-10:30 *Invited Plenary Talk*
Alexander Domoshnitsky, *Oscillation and Asymptotic Properties of Second Order Delay Equations: New Trends*
- 10:30 – 11:00 **Coffee Break**
Chair: Alexander Domoshnitsky
- 11:00 – 11:30 Irina Volinsky, *Stability Analysis of Bladder Cancer Model with BCG and IL-2 Infusion Treatment*
- 11:30 – 12:00 Sergey Malev, Alexei Kanel-Belov, Mehdi Golafshan, Roman Yavich, *On the Distribution Function of Area and Perimeter for Planar Poisson Line Process*
- 12:00 – 12:30 Aleksander Domoshnitsky, Sergey Malev, Vladimir Raichik, *About Sign-Constancy of Green's Functions of Two-point Impulsive Boundary Value Problems for Second Order Delay Differential Equations*
- 12:30- 13:00 Angela Slavova, *Local Activity Theory and Edge of Chaos*
- 13:00 – 14:00 **Lunch Break**

14:00-15:00 **SESSION 1**

Chair: Angela Slavova

Invited Plenary Talk

Li Ma, 2-d Minimal Surface Flow with the Oblique Condition and Translators

15:00 – 15:30 **Coffee Break**

15:30 – 17:00 **SESSION 2: APPLICATIONS IN MATHEMATICAL PHYSICS**

Chair: Tsviatko Rangelov

15:30 – 16:00 Nikolay Vitanov, *Several Relationships Connected to a Special Function used in the Simple Equations Method (SEsM)*

16:00 – 16:30 Zlatinka Dimitrova, *On the Exact Solution of a Sequence of Nonlinear Differential Equations Possessing Polynomial Nonlinearities*

16:30 – 17:00 Elena Nikolova, Mila Chilikova-Lubomirova, *Exact analytical solutions of the fractional Wu-Zhang system via Simple Equations Method (SEsM): The Case of Two Simple Equations*

17:00-18:30 **SESSION 3: APPLICATIONS IN MATHEMATICAL PHYSICS**

Chair: Nikolay Vitanov

17:00 – 17:30 Nikolai Kutev, Milena Dimova, Natalia Kolkovska, *Finite Time Blow up of the Solutions to Klein-Gordon Equation with Critical Initial Energy*

17:30 – 18:00 Tsviatko Rangelov, Nikolai Kutev, *Improved Hardy Inequality with Logarithmic Term*

18:00 – 18:30 Pavel Dubovski, *Solutions to the Kinetic Fragmentation Equation*

19:00 **Welcome party**

Tuesday, July 18th

9:30-10:30 **SESSION 4**

Chair: Tzanko Donchev

9:30 – 10:30 *Invited Plenary Talk*

Petar Popivanov, *Graphical Portraits of the Solutions of Binary First Order Nonlinear Ordinary Differential Equations near their Singular Point*

10:30 – 11:00 **Coffee Break**

11:00-13:00 **SESSION 5: APPLICATIONS IN FRACTIONAL ANALYSIS**

Chair: Elena Nikolova

11:00 – 11:30 Natalia Dilna, *Exact Conditions on the Unique Solvability of the Linear Fractional Functional Differential Equations*

11:30 – 12:00 Snezhana Hristova, *Mittag - Leffler Stability for Non-Instantaneous Impulsive Generalized Proportional Caputo Fractional Differential Equations*

12:00 – 12:30 Tzanko Donchev, Jamil Abbas, Nikolay Kitanov, Alina I. Lazu, *Uniqueness Functions to Conformable Differential Equations*

12:30 – 13:00 Pavel Dubovski, *Quasi-Bessel Equations and Hyper-Dimensionality*

13:00 – 13:30 Snezhana Hristova, Radoslava Terzieva, *Impulses in Generalized Proportional Caputo Fractional Differential Equations and Equivalent Integral Presentation*

13:30 – 14:30 **Lunch Break**

14:30 – 16:30 **SESSION 6: APPLICATIONS IN FINANCIAL MATHEMATICS**

Chair: Venelin Todorov

14:30-15:00 Aleksandra Klimenko, Vesela Mihova, Slavi Georgiev, Ivan Georgiev, Velizar Pavlov, *Comparative Analysis on Neural Networks and ARIMA for Forecasting Heterogenic Portfolio Returns*

15:00-15:30 Elitsa Raeva, Velizar Pavlov, Hedio Redjeb, *Comparison between the Chain Ladder Method and the Bornhuetter-Ferguson Method for Liability Insurance*

15:30 – 16:00 Teodora Klimenko, Velizar Pavlov, *Iterative Calibration of Implied Volatility for European Options: A Computational Approach*

16:00 – 16:30 Elitsa Raeva, Iliyana Raeva, Yovana Ivanova, *Mixed Approach between Capital Asset Pricing Model and ARIMA Model for Estimating the Standard and Poor's Stocks*

16:30 – 17:00 ***Coffee Break***

17:00-18:30 **SESSION 7: APPLICATIONS IN MATHEMATICAL BIOLOGY**

Chair: Zlatinka Dimitrova

17:00-17:30 Slavi Georgiev, *Inverse Modelling of the Cellular Immune Response to SARS-CoV-2*

17:30- 18:00 Nikolay K. Vitanov, *Simple Equations Method (SEsM): Exact Solutions for Description of COVID-19 Epidemic Waves*

18:00 – 18:30 Slavi Georgiev, Lubin Vulkov, *Determination of Space-Dependent Coefficients in a Integro-Hyperbolic System Model of Honeybee Population Dynamics*

Wednesday, July 19th

9:30-10:30 **SESSION 8**

Chair: Angela Slavova

Invited Plenary Talk

Daniela Doneva, *Nonlinear Evolution of Black Holes in Modified Theories of Gravity*

10:30 – 11:00 ***Coffee Break***

11:00-13:00 **SESSION 9: APPLICATIONS IN MATHEMATICAL PHYSICS**

Chair: Daniele Barbera

11:00 – 11:30 Zlatinka Dimitrova, Yoana Chorbazhiyska – Stamenova,
Influence of Stimulus on the Motion of Substance in a Channel of Network

11:30-12:00 Yoshihiro Mochimaru, *Definite / Indefinite Integrals Involving Non-integral Powers for Certain Trigonometric Functions Times Special Functions*

12:00-12:30 Tsviatko V. Rangelov, Petia S. Dineva, George D. Manolis, A
Dynamic Green's Function for the Homogeneous Viscoelastic and Isotropic Half-Space

12:30-13:00 Vladimir Kotev, Miriam Rame, Georgi Ivanov, Mirjana Ivanova,
Ivan P. Jordanov, *A Didactic Approach to Study Mass Inertial Characteristics of Bodies in Planar Rotation Motion*

13:00 – 14:00 ***Lunch Break***

- 14:00-15:00 **SESSION 10**
Chair: Irina Volinsky
Invited Plenary Talk
Elena Litsyn, Angela Slavova, *Physics Informed Neural Networks for Solving Differential Equations*
- 15:00 – 15:30 **Coffee Break**
- 15:30- 17:00 **SESSION 11: APPLICATIONS IN FRACTIONAL ANALYSIS**
Chair: Natalia Dilna
- 15:30-16:00 Miglena N. Koleva, Lubin G. Vulkov, *Determination of the Time Dependent Diffusion Coefficient of a Space Fractional Parabolic Equation*
- 16:00- 16:30 R. Nikolov , V. Boutchaktchiev , I. Jordanov , E. Nikolova, *Several Exact Solutions of the Fractional Predator – Prey Model via the Simple Equations Method (SEsM)*
- 16:30- 17:00 Elena V. Nikolova, *Exact Solutions of the Diffusive Predator – Prey System with Fractional Derivative Order*
- 17:00-19:00 **SESSION 12: APPLICATIONS IN FINANCIAL MATHEMATICS**
Chair: Slavi Georgiev
- 17:00-17:30 Vilislav Boutchaktchiev, *Applications of the Inferred Rate of Default to Capital Adequacy Estimation in Credit Portfolios*
- 17:30-18:00 Venelin Todorov, Slavi Georgiev, *Advanced Stochastic Monte Carlo Optimization Methods for Two-dimensional European Style Options*
- 18:00 – 18:30 Tsvetelin Tsonev, Slavi Georgiev, Ivan Georgiev, Vesela Mihova, Velizar Pavlov, *Portfolio Construction Using Neural Networks and Multiobjective Optimization*
- 18:30-19:00 Nikolay Kyurkchiev, Tsvetelin Zaevski, Anton Iliev, Asen Rahnev,

Some modifications of the Kies distribution. Applications

20:00 ***Official Dinner***

Thursday, July 20th

9:30-11:00 **SESSION 14: APPLICATIONS IN NUMERICAL METHODS**

Chair: Sergey Malev

9:30 – 10:00 Venelin Todorov, Slavi Georgiev, Ivan Dimov, *Special Lattice and Digital Sequences for Multidimensional Air Pollution Modelling*

10:00 – 10:30 David Kapanadze, Zurab Vashakidze, *Wave Propagation in a Triangular Lattice with Discrete Sources Placed on Line Segments*

10:30 - 11:00 Jai Prakash Tripathi, *A Natural Enemy-Pest Model: Effect of Additional Food and Harvesting*

11:00 – 11:30 ***Coffee Break***

11:30 – 13:30 **SESSION 15: APPLICATIONS IN NUMERICAL METHODS**

Chair: Ivan Jordanov

11:30 – 12:00 Venelin Todorov, Slavi Georgiev, *Novel Stochastic Method for Multidimensional Fredholm Integral Equations*

12:00 – 12:30 Miglena N. Koleva, Lubin G. Vulkov, *Reconstruction of Boundary Conditions of a Parabolic-Hyperbolic Transmission Problem*

12:30 – 13:00 Venelin Todorov, Slavi Georgiev, Ivan Dimov, *Novel Monte Carlo Algorithm for Linear Algebraic Systems*

13:00 – 13:30 Atanaska Georgieva, *Solution of Fuzzy Euler Differential Equation by Fuzzy Temimi Transform*

13:30 – 14:30 ***Lunch Break***

14:30-16:00 **SESSION 16: APPLICATIONS IN MATHEMATICAL PHYSICS**

Chair: Vladimir Raichik

14:30 – 15:00 Mirko Tarulli, George Venkov, Elena Nikolova, *Dynamics of the Solution of the Magnetic Radial Schrödinger-Hartree Equation in Higher Dimensions*

15:00 – 15:30 Daniele Barbera, *The Ericksen-Leslie System for Data on a Plane*

15:30 - 16:00 Mario Rastrelli, *Laplacian Perturbed with Inverse Square Potential: The Domain of its Square*

16:00 – 16:30 ***Coffee Break***

16:30-19:00 **SESSION 16: APPLICATIONS IN MATHEMATICAL PHYSICS**

Chair: Mario Rastrelli

16:30 – 17:00 Ivan P. Jordanov, *An Application of the Simplest Equations Method to Logarithmic Schrödinger Equation*

17:00 – 17:30 Tsanko Donchev, Nikolaj Kitanov, Alina Lazu, I. Nikolova, *One Sided Lipschitz Conformable Evolution Inclusions*

17:30 – 18:00 Maria Vasileva, Vesselin Kyurkchiev, Anton Iliev, Asen Rahnev, Nikolay Kyurkchiev, *Some Applications of the Dickson Polynomials of Higher Kind for Modeling Radiation Diagrams*

18:00 – 18:30 Maria Vasileva, Nikolay Kyurkchiev, *A Note on the Hwang-Kim's Universal activation function*

18:30 – 19:00 Imane Boussetouan, *Regularity Results for the Navier-Stokes Equations with Mixed Boundary Conditions Involving the Pressure*

19:00 – 19:30 Gaukhar Shaikhova, Araylym Syzdykova, *Explicit solutions of nonlinear Schrödinger-type equations arising in physics sciences*