



SCIENTIFIC PROGRAM

**New Trends in the Applications of Differential Equations in
Sciences (NTADES'21)**

6-9 September, 2021, St. Constantine and Helena

Bulgaria



Financial Support by the Project KP-06-MNF/10

Monday, September 6th

09:30–10:00 **Registration**

10:00 – 10:10 **OPENING**

10:10-13:00 **SESSION 1**

10:10 – 10:30 Luigi Rodino, *Microlocal Analysis and the work of Acad. Petar Popivanov*

10:30 – 11:00 **Coffee Break**

11:00 – 12:00 *Invited Plenary Talk*
Nikolay K. Vitanov, *Simple Equations Method (SEsM): Review and New Results*

12:00 – 12:30 Petar Popivanov, *Generic forms of non-degenerate 2nd order linear PDE in 1D*

12:30 – 13:00 Nikolaj Kutev, Milena Dimova, Natalia Kolkovska, *A note on orbital stability of solitary waves to double dispersion equation*

13:00 – 14:00 **Lunch Break**

14:00-15:30 **SESSION 2 APPLICATIONS IN NEUROSCIENCES**

14:00 – 14:30 Alon Ascoli, *On Edge of Chaos in a Locally-Active Memristor and in its Circuits*

14:30 – 15:00 Angela Slavova, *Pattern formation in Memristor Cellular Neural Networks*

- 15:00 – 15:30 Maya Markova, *Convolutional Neural Networks for Forex Time Series Forecasting*
- 15:30 – 16:00 ***Coffee Break***
- 16:00- 18:30 **SESSION 3: APPLICATIONS IN MATHEMATICAL PHYSICS**
- 16:00 – 16:30 Zlatinka Dimitrova, *Several examples of application of the Simple Equations Method (SEsM) for obtaining exact solutions of nonlinear PDEs*
- 16:30 – 17:00 Zornitsa Petrova, *Oscillations of generalizations of a fourth order dispersive equation*
- 17:00 - 17:30 Nikolaj Kutev, Tsviatko Rangelov, *Application of Hardy inequalities for some singular parabolic equations*
- 17:30 – 18:00 Elena Nikolova, Mirko Tarulli, George Venkov, *On the well-posedness in Lorentz spaces for the inhomogeneous heat equation*
- 18:00 – 18:30 Ekaterina A. Titova, *Boundary integral method with convection for the needle dendrite growth*
- 19:00 ***Welcome party***

Tuesday, September 7th

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

9:30 – 10:30 *Invited Plenary Talk*

Rossella Agliardi, *On optimal stopping problems arising in real option theory*

10:30 – 11:00 ***Coffee Break***

11:00-13:00 **SESSION 5: APPLICATIONS IN FINANCIAL MATHEMATICS**

11:00 – 11:30 Elitsa Raeva, Velizar Pavlov, *Inflation as a factor in the Chain Ladder Method for estimating outstanding claims reserves*

11:30 – 12:00 Ivan Georgiev, Virginia Centeno, Vesela Mihova, Velizar Pavlov, *A modified ordinary differential equation approach in price forecasting*

12:00 – 12:30 Vesela Mihova, Virginia Centeno, Ivan Georgiev, Velizar Pavlov, *An application of modified ordinary differential equation approach for successful trading on the Bulgarian stock exchange*

12:30 – 13:00 Slavi G. Georgiev, Byulent B. Idirizov, *Jump-diffusion modelling of the gold and crude oil futures prices and predictive analysis of their economic impact*

13:00 – 14:00 ***Lunch Break***

14:00-17:30 **SESSION 6: APPLICATIONS IN MATHEMATICAL PHYSICS**

14:00-15:00 *Invited Plenary Talk*

Vladimir Georgiev, Yuan Li, *On mass critical half-wave equation in 3D*

- 15:00 – 15:30 **Coffee Break**
- 15:30 – 16:00 Daniele Barbera, Vladimir Georgiev, *Beris-Edward's model with absence of flow*
- 16:00 – 16:30 Tommaso Cortopassi, Vladimir Georgiev, *A generalised Nehari manifold method for a class of nonlinear Schrödinger systems in R^3*
- 16:30 – 17:00 Vladimir Georgiev, Mario Rastrelli, *On Kuramoto-Sivashinsky model*
- 17:00 – 17:30 Yoshihiro Mochimaru, *Zeros of Transcendental Equations*
- 17:30-19:30 **SESSION 7: APPLICATIONS IN MECHANICS**
- 17:30-18:00 Tsviatko Rangelov, Petia Dineva, *SH-wave scattering by two nanocracks in a graded PEM plane*
- 18:00-18:30 Nilolay Kutev, Sonia Tabakova, *Analysis of general unsteady flow of Carreau-Yasuda fluid in a pipe*
- 18:30-19:00 Elena V. Nikolova, Mila Chilikova – Lubomirova, *Exact traveling wave solutions of the Nikolaevskiy model for nonlinear seismic waves*
- 19:00-19:30 Dmitri V. Alexandrov, Eugeny V. Makoveeva, Margarita A. Nikishina, Irina V. Alexandrova and Alexander A. Ivanov, *On the theory of evolution of particulate assemblages in a metastable liquid*

Wednesday, September 8th

- 9:30-11:00 **SESSION 8: APPLICATIONS IN FRACTIONAL ANALYSIS**
- 9:30-10:00 Snezhana Hristova, Zoubida Bouazza, Mohammed Said Souid, *Nonlinear implicit differential equations of fractional order at resonance*
- 10:00-10:30 Snezhana Hristova, Mohamed I. Abbas, *Fractional differential equations with anti-periodic fractional integral boundary conditions via the generalized proportional fractional derivatives*
- 10:30-11:00 Nikolay K. Vitanov, *Simple Equations Method (SEsM) and nonlinear PDEs with fractional derivatives*
- 11:00 – 11:30 ***Coffee Break***
- 11:30-13:00 **SESSION 9: APPLICATIONS IN FINANCIAL MATHEMATICS**
- 11:30-12:00 Tihomir B. Gyulov, Miglena N. Koleva, *ADI finite difference method for time-fractional multi-asset Black-Scholes problem governing European options*
- 12:00-12:30 Maya Markova, *Forecasting EUR/USD exchange rate with NARX neural networks*
- 12:30-13:00 Elena V. Nikolova, *Dynamical analysis of interactions among three economic sectors*
- 13:00 – 14:00 ***Lunch Break***
- 14:00-15:30 **SESSION 10: APPLICATIONS IN MATHEMATICAL PHYSICS**
- 14:00-14:30 Petar Popivanov, Angela Slavova, *Explicit solutions and geometric visualization of the solutions of several classes of nonlinear Schrödinger equations arising in physics*
- 14:30-15:00 Zlatinka Dimitrova, *On several specific cases of the simple*

equations method (SEsM): Jacobi elliptic function expansion method, F-expansion method, modified simple equation method, trial function method, general projective Riccati equations method, and first integral method

15:00-15:30 Ivan P. Jordanov, *Simple Equations Method applied to equations of nonlinear Schrödinger kind*

15:30 – 16:00 **Coffee Break**

16:00-19:30 **SESSION 10: APPLICATIONS IN SCIENCES**

16:00-16:30 Atanaska Georgieva, *Solving Volterra-Fredholm fuzzy integro-differential equations by using Homotopy analysis method*

16:30-17:00 Venelin Todorov, Ivan Dimov, Tzvetan Ostromsky, Rayna Georgieva, *Optimal stochastic algorithms for multidimensional sensitivity analysis of large ecological model*

17:00-17:30 Ivan Georgiev, Asen Asenov, Velizara Pencheva, *Optimizing the working hours of drivers in public transport of passengers*

17:30-18:00 K. Damov, I. Angelov, I. Bardarov, M. Ilieva, Ivan P. Jordanov, M. T. Iliev, Vilislav Boutchaktchiev, *Relative distribution of mass density in AsLV and liquids- a comparison between experimental and literature data*

18:00 – 18:30 M. S. Soud, K. Ivanova, *Finite time stability of neutral delay impulsive differential equations*

18:30 – 19:00 Todor Zhelyazov, *Analytical investigation of wave propagation in a deformable viscoelastic media provoked by a transient load*

19:00 – 19:30 Atanaska Georgieva, Mira Spasova, *Solution of partial fuzzy integro-differential equations by double Natural transform*

20:00 **Official Dinner**

Thursday, September 9th

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

9:30 – 10:30 *Invited Plenary Talk*

Alexander Domoshnitsky, *Floquet theory for delay differential equations of the first order*

10:30 – 11:00 Pavel Stoyanov, *Applications of ST distributions to neural network and regression models*

11:00 – 11:30 Nikolay Kyurkchiev, *A look at the smooth approximation to $|f(x)|$ using some sigmoidal functions. Applications*

11:30 – 12:00 Vesselin Kyurkchiev, Anton Iliev, Asen Rahnev, Nikolay Kyurkchiev, *Analysis of a novel class of the growth model by Baranyi and Roberts. Some applications*

12:00 – 12:30 Maria Vasileva, Anna Malinova, Olga Rahneva, Evgenia Angelova, *A note on the unit-Rayleigh "Adaptive Function"*

12:30 ***Closing Ceremony***