

SCIENTIFIC PROGRAM  
OF THE 44th INTERNATIONAL CONFERENCE  
APPLICATIONS OF MATHEMATICS IN ENGINEERING AND  
ECONOMICS  
SOZOPOL, JUNE 8-13, 2018

Registration and accommodation of the participants in the Conference

Leisure House of the Technical University of Sofia

SCIENTIFIC PROGRAM  
OF THE 44th INTERNATIONAL CONFERENCE  
APPLICATIONS OF MATHEMATICS IN ENGINEERING AND  
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SOZOPOL, JUNE 8-13, 2018

June 9, 2018 (Saturday)

Registration and accommodation of the participants in the Conference  
Leisure House of the Technical University of Sofia

Hall 1: Plenary Talks

Chairperson: G. VENKOV

9:00-10:00    Opening

10:00-10:30    N. POPIVANOV (Sofia University, BULGARIA)  
*Pohozhaev Identities as Conservation Laws for Semi-Linear  
Elliptic-Hyperbolic Equations*

10:30-11:00    E. RADKEVICH (Lomonosov Moscow State University,  
RUSSIA)  
*An example of nonclassical hydrodynamics*

***Coffee Break***

11:30-12:00    A. SOLDATOV (Dorodnitsyn Computer Center of RAS,  
RUSSIA)  
*The Riemann-Hilbert problem for the Moisil-Teodoresku  
system*

12:00-12:30    P. VELMISOV (Ulyanovsk State Technical University, RUSSIA)  
*Asymptotic study of nonlinear viscous gas flows*

***Lunch Break***

Hall 1: Special Session PDE

Chairperson: N. POPIVANOV

15:00-15:20    E. MOISEEV (Lomonosov Moscow State University, RUSSIA)  
*On completeness of perturbed sine and cosine systems in the  
space of integrable functions*

- 15:20-15:40 A. DAVYDOV (Lomonosov Moscow State University, RUSSIA)  
*Invariants of normal forms of mixed type equations on the plane*
- 15:40-16:00 I. EGOROV (Ammosov North-Eastern Federal University, RUSSIA)  
*On the Solvability of Boundary Value Problems with a Boundary Condition of Integral Form for a Parabolic Equation with a Changing Time Direction*

### **Coffee Break**

- 16:20-16:40 I. PETRUSHKO (Moscow Power Institut, RUSSIA)  
*On boundary and initial conditions of solutions of strong degenerating parabolic equation*
- 16:40-17:00 N. KAPUSTIN (Lomonosov Moscow State University, RUSSIA)  
*Spectral method in the theory of mixed-type equations*
- 17:00-17:20 T. POPOV (Sofia University)  
*Singular solutions of the  $(3+1)$ -D Protter problem for the wave equation*
- 17:20-17:40 T. HRISTOV (Sofia University, BULGARIA)  
*Exact Behavior of Singular Solutions to the Protter-Morawetz Problem for Keldysh-Type Equations*

### Hall 2: Operations Research

Chairperson: S. KRUGLIKOV

- 15:40-16:00 S. KABAIVANOV (University of Plovdiv, BULGARIA)  
*Modeling the Innovative Potential of Companies in the Pharmaceutical Industry in Bulgaria*
- 16:00-16:20 S. KABAIVANOV (University of Plovdiv, BULGARIA)  
*The Consequences of Rising Bulgarian Government Debt and The Search of Growth in Eastern Europe*
- 16:20-16:40 M. KOLEVA (University of Ruse, BULGARIA)  
*Finite Difference Penalty Methods for Pricing Two-Factor American Put Option*

### **Coffee Break**

- 17:00-17:20 A. MEDVEDEV (Ural Federal University, RUSSIA)  
*Statistical Analysis of the Spatial Distribution of Impurities in the Snow Cover in the Vicinity of Copper Mine in the Middle Urals of Russia*
- 17:20-17:40 A. MEDVEDEV (Ural Federal University, RUSSIA)  
*Classification of online toxic comments using the logistic regression and neural networks models*

- 17:40-18:00 A. FILIPPOVA (Ural Federal University, RUSSIA)  
*Application of Dynamic Economic-Mathematical Modeling in Optimization Problems in Banking*
- 18:00-18:20 M. MEDVEDEV (Ural Federal University, RUSSIA)  
*On the use of cluster analysis for interpretation of soil pollution monitoring data obtained near mining enterprise*
- 18:20-18:40 M. MEDVEDEV (Ural Federal University, RUSSIA)  
*About some economic applications of cohort analysis*

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June 10, 2018 (Sunday)

Hall 1: Plenary Talks

Chairperson: A. SOLDATOV

- 9:30-10:00 V. GEORGIEV (University of Pisa, ITALY)  
*Existence and uniqueness of ground states for  $p$ -Choquard model in 3D*
- 10:00-10:30 M. SADYBEKOV (Institute of Mathematics and Mathematical Modeling, KAZAKHSTAN)  
*Direct and inverse problems for the Poisson equation with equality of flows on a part of boundary*

**Coffee Break**

- 11:00-11:30 M. KONSTANTINOV (University of Architecture, Civil Engineering and Geodesy, BULGARIA)  
*Numerical computations with large error*
- 11:30-12:00 T. ATANACKOVIC (University of Novi Sad, SERBIA)  
*Wave equation in fractional Zener-type viscoelastic media involving fractional derivatives with regular kernel*

**Lunch Break**

Hall 1: Math Analysis & Applications

Chairperson: J. PANEVA-KONOVSKA

- 16:00-16:20 A. ALIDEMA (University of Pristina, KOSOVO)  
*Adomian decomposition method for solving of two-dimensional nonlinear Volterra fuzzy integral equations*
- 16:20-16:40 A. GEORGIEVA (University of Plovdiv, BULGARIA)  
*Iterative numerical method for two-dimensional nonlinear Fredholm fuzzy functional integral equations*
- 16:40-17:00 A. PAVLOVA (Technical University of Sofia branch Plovdiv, BULGARIA)  
*Existence and uniqueness of two-dimensional nonlinear Urisohn-Volterra fuzzy functional integral equations*

## **Coffee Break**

- 17:30-17:50 D. BITTNEROVA (Technical University of Liberec, CZECH REPUBLIC)  
*Application Problems for Unconventional Computing Figure Areas bounded by Algebraic Closed Curves*
- 17:50-18:10 A. ILCHEV (University of Plovdiv, BULGARIA)  
*Error Estimates for Approximating Best Proximity Points for Kannan Cyclic Contractive Maps*
- 18:10-18:30 A. ILCHEV (University of Plovdiv, BULGARIA)  
*On an Application of Coupled Best Proximity Points Theorems for Solving Systems of Linear Equations*
- 18:30-18:50 D. BREZOV (University of Architecture, Civil Engineering and Geodesy, BULGARIA)  
*Optimization and Gimbal Lock Control via Shifted Decomposition of Rotations*
- 18:50-19:10 D. BREZOV (University of Architecture, Civil Engineering and Geodesy, BULGARIA)  
*Variation on a Theme by Guillemin and Molrose*
- 19:10-19:30 S. DIMITROV (Technical University of Sofia, BULGARIA)  
*Diophantine approximation by special primes*
- 19:30-19:50 S. DIMITROV (Technical University of Sofia, BULGARIA)  
*Consecutive square-free numbers of a fixed type*
- 19:50-20:10 N. SIRAKOVA (Technical University of Sofia, BULGARIA)  
*Conditionally Stable Case for Nonlinear TPBVP with Double Singularity*

## Hall 2: Operations Research

Chairperson: M. KONSTANTINOV

- 16:00-16:20 S. KRUGLIKOV (Ural Federal University, RUSSIA)  
*Operator research presentation of the system of state support for the regional industry*
- 16:20-16:40 M. KONSTANTINOV (University of Architecture, Civil Engineering and Geodesy, BULGARIA)  
*Extreme behaviour of the Bulgarian electoral system*
- 16:40-17:00 B. NEDEV (Sofia University, BULGARIA)  
*Dynamics of the momentum effect at the NYSE from the perspective of behavioral finance*

## **Coffee Break**

- 17:30-17:50 G. BARD (University of Wisconsin - Stout, USA)  
*Determining Whether a Given Cryptographic Function is a Permutation of Another Given Cryptographic Function - a Problem in Intellectual Property*

- 17:50-18:10 V. KRASTEV (Tsenov Academy of Economics, BULGARIA)  
*The repayment of a loan with equal payments and the minimization of the credit risk*
- 18:10-18:30 B. BOGDANOVA (Sofia University, BULGARIA)  
*Wavelet insights on the momentum patterns observed at the New York Stock Exchange*
- 18:30-18:50 A. IVANOVA (University of Forestry , BULGARIA)  
*Domain Ontology of Sustainable Development in Economic*
- 18:50-19:10 R. ILIEVA (Technical University of Sofia, BULGARIA)  
*Structural Approach for Organizational Agility Path Analysis*
- 19:10-19:30 S. POPOV (Technical University of Sofia, BULGARIA)  
*Stochastic approach to team selection*

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June 11, 2018 (Monday)

Hall 1: Special Session PDE  
Chairperson: P. VELMISOV

- 8:50-9:20 S. DOBROKHOTOV (Ishlinsky Institute for Problems in Mechanics, RUSSIA)  
*Localized asymptotic solutions to 2-D linear and nonlinear wave equation with degenerated velocity and application to the run-up problem*
- 9:20-9:40 A. FURSIKOV (Lomonosov Moscow State University, RUSSIA)  
*Stabilization of hydrodynamical type systems by feedback control*
- 9:40-10:00 M. PLEKHANOVA (Chelyabinsk State University, RUSSIA)  
*Semilinear equations of fractional order and optimal control*

***Coffee Break***

- 10:30-10:50 P. VELMISOV (Ulyanovsk State Technical University, RUSSIA)  
*Stability of solutions of initial-boundary value problems in aerohydroelasticity*
- 11:50-12:10 M. FILIMONOV (Ural Federal University, RUSSIA)  
*On application of Fourier method for one class of equations describing nonlinear oscillations*
- 12:10-12:30 M. FILIMONOV (Ural Federal University, RUSSIA)  
*Application of admissible functions in studying partial stability of solutions of a nonlinear system of differential equations*
- 12:30-12:50 V. FEDOROV (Chelyabinsk State University, RUSSIA)  
*Solvability of some classes of degenerate evolution fractional order equations*
- 12:50-13:10 J. MILEV (Technical University of Sofia, BULGARIA)  
*Mathematical analysis for thermal fields in the integral microchems*



Hall 2: Special session Fractional Calculus, Special Functions & Applications

Chairperson: V. KIRYAKOVA

- 9:00-9:20 J. PANEVA-KONOVSKA (Technical University of Sofia, BULGARIA)  
*Bessel type functions: Relations with integrals and derivatives of arbitrary orders*
- 9:20-9:40 M. JANEV (Serbian Academy of Sciences and Arts, SERBIA)  
*Non-linear boundary value problems involving Caputo derivatives of complex fractional order*
- 9:40-10:00 Y. NIKOLOVA (Technical University of Sofia, BULGARIA)  
*Solving Some Fractional Order Differential Equations by Means of Intergal Transforms and Special Functions*

**Coffee Break**

- 10:30-10:50 I. BAZHLEKOV (Bulgarian Academy of Sciences, BULGARIA)  
*Fractional derivative model for surfactant transport in multi-phase flow*
- 11:50-12:10 E. BAZHLEKOVA (Bulgarian Academy of Sciences, BULGARIA)  
*General fractional diffusion-wave equations*
- 12:10-12:30 A. ZAHARIEV (University of Plovdiv, BULGARIA)  
*Asymptotic stability of delayed fractional system with nonlinear perturbation*

Hall 3: Numerical Methods

Chairperson: L. VULKOV

- 9:00-9:20 N. VAGANOVA (Ural Federal University, RUSSIA)  
*Simulation of Thermal Stabilization of Bases under Engineering Structures in Permafrost Zone*
- 9:20-9:40 N. VAGANOVA (Ural Federal University, RUSSIA)  
*Computer Simulation of Operation of an Open Geothermal System Consisting of Three Wells*
- 9:40-10:00 Y. SLAVCHEV (Technical University of Sofia, BULGARIA)  
*Computer Analysis of the Transient Thermal Process in Brake Discs Taking into Consideration the Influence of the Model Space Dimension and the Disc Design*

**Coffee Break**

- 10:30-10:50 A. SERGEEV (Ural Federal University, RUSSIA)  
*Training Algorithms for Artificial Neural Network in Predicting of the Content of Chemical Elements in the Upper Soil Layer*
- 11:50-12:10 A. SERGEEV (Ural Federal University, RUSSIA)  
*Time Series Forecasting of Methane Concentrations in the Surface Layer of Atmospheric Air in Arctic Region*
- 12:10-12:30 K. PETKOV (Technical University of Sofia, BULGARIA)  
*Robust  $H_\infty$  and  $H_2$  control for linear parametric dynamical systems*
- 12:30-12:50 K. TARNEV (Technical University of Sofia, BULGARIA)  
*Axial evolution of the electron energy distribution in capacitive discharges*
- 12:50-13:10 B. GILEV (Technical University of Sofia, BULGARIA)  
*Mixed Sensitive Controller Design for Wind Turbine*

### **Lunch Break**

Hall 1: Differential Equations

Chairperson: L. KARANDZHULOV

- 16:00-16:20 A. SESEKIN (Ural Federal University, RUSSIA)  
*Impulse Position Controls for Differential Inclusions*
- 16:20-16:40 R. TERZIEVA (University of Plovdiv, BULGARIA)  
*Stability with respect to part of variables of nonlinear differential equations with non-instantaneous impulses*
- 16:40-17:00 T. KOSTADINOV (Technical University of Sofia branch Plovdiv, BULGARIA)  
*Stability with two measures of delay differential equations with non-instantaneous impulses*

### **Coffee Break**

- 17:30-17:50 M. TARULLI (Technical University of Sofia, BULGARIA)  
*Scattering for Systems of  $N$  Weakly Coupled NLS Equations on  $R^d \times M^k$  in Non-Isotropic Sobolev Fractional Spaces*
- 17:50-18:10 B. KOSTADINOV (Technical University of Sofia, BULGARIA)  
*Goursat Problem over Unit Cube in First Quadrant of  $R^n$  (with Applications to Existence of Copulas)*
- 18:10-18:30 B. KOSTADINOV (Technical University of Sofia, BULGARIA)  
*Solitary waves for Schrodinger-Choquard equation*
- 18:30-18:50 A. SLAVOVA (Bulgarian Academy of Sciences, BULGARIA)  
*Dynamics of CNN Model of a Class of Integro-Differential Equations*
- 18:50-19:10 Z. PETROVA (Technical University of Sofia, BULGARIA)  
*Mathematical modeling of the equation of Duffing with applications to master degree students*

## Hall 2: Statistics & Probability

Chairperson: K. PRODANOVA

- 16:00-16:20 M. LAZAROVA (Technical University of Sofia, BULGARIA)  
*Polya-Aeppli risk models*
- 16:20-16:40 M. LAZAROVA (Technical University of Sofia, BULGARIA)  
*Noncentral Polya-Aeppli distribution*
- 16:40-17:00 K. PRODANOVA (Technical University of Sofia, BULGARIA)  
*Survival Analysis for Data of Neuroblastoma*

### **Coffee Break**

- 17:30-17:50 W. KEMPA (Silesian University of Technology, POLAND)  
*Non-stationary queue size behaviour in a finite-buffer model with Bernoulli-type constant vacations*
- 17:50-18:10 W. KEMPA (Silesian University of Technology, POLAND)  
*Transient analysis of a finite-capacity queueing model with balking and repair periods*
- 18:10-18:30 R. KOBILAROV (Technical University of Sofia, BULGARIA)  
*Application of the geostatistical method in radioecology*
- 18:30-18:50 A. MARCHEV (University for National and World Economy, BULGARIA)  
*Scoring of prediction and investment models for cryptocurrencies trading*

## Hall 3: Numerical Methods

Chairperson: K. TARNEV

- 16:00-16:20 J. HOZMAN (Technical University of Liberec, CZECH REPUBLIC)  
*Numerical Pricing of Options under the Exponential Ornstein-Uhlenbeck Stochastic Volatility Model based on a DG Technique*
- 16:20-16:40 P. SALAČ (Technical University of Liberec, CZECH REPUBLIC)  
*Numerical results for the cooling power optimization problem*
- 16:40-17:00 R. KNOBLOCH (Technical University of Liberec, CZECH REPUBLIC)  
*A Differential Evolution Algorithm in the Optimization Task with a Lipschitz Continuous Cost Function*

### **Coffee Break**

- 17:30-17:50 V. FINEK (Technical University of Liberec, CZECH REPUBLIC)  
*Adaptive Wavelet Scheme for Black-Scholes Equation using Hermite Cubic Spline Wavelets*
- 17:50-18:10 L. VULKOV (University of Ruse, BULGARIA)  
*Numerical Solution of Direct and Inverse Problems for Degenerate Parabolic Equations with Concentrated Sources*
- 18:10-18:30 I. DIMOV (Bulgarian Academy of Sciences, BULGARIA)  
*Positive Fitted Finite Volume Method for Semi-linear Parabolic Systems Transformed on Finite Interval*
- 18:30-18:50 M. MILEV (University of Food Technologies, BULGARIA)  
*Application of Lagrange Interpolation in Option Pricing*
- 18:50-19:10 S. BOZHKOV (University of Food Technologies, BULGARIA)  
*Application of Jacobi Polynomials in Option Pricing*

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June 12, 2018 (Tuesday)

Hall 1: Numerical Methods

Chairperson: A. SESEKIN

- 9:00-9:20 A. SESEKIN (Ural Federal University, RUSSIA)  
*Optimal control of the system of coupled cylinders -  
Numerical Methods*
- 9:20-9:40 S. KRUGLIKOV (Ural Federal University, RUSSIA)  
*Discrete Event Algorithm of Information Image Forming*
- 9:40-10:00 V. GEORGIEVA (University of Plovdiv, BULGARIA)  
*Geometric path planning and tracking control with bounded  
steering angle for the parking problem of automatic vehicles*

**Coffee Break**

- 10:30-10:50 J. MILEV (Technical University of Sofia, BULGARIA)  
*Generalized relations*
- 10:50-11:10 S. TSVETANOV (Technical University of Sofia, BULGARIA)  
*Sequential Algorithm for finding k-shortest paths*
- 11:10-11:30 I. SPASOV (Technical University of Sofia, BULGARIA)  
*Modeling and simulation of QUENCH-12 experiment with  
RELAP/SCDAPSIM mod3.5 computer code*
- 11:30-11:50 A. GENCHEV (Technical University of Sofia, BULGARIA)  
*Learning procedures in evolutionary cooperative bargaining*

Hall 3: E-learning & Software Innovations

Chairperson: D. IVANOVA

- 9:00-9:20 R. PEYCHEVA-FORSYTH (Sofia University, BULGARIA)  
*Changing students' perspective in e-assessment through the  
use of authentication and authorship checking system*
- 9:20-9:40 B. YOVKOVA (Sofia University, BULGARIA)  
*Special educational needs and disability as a factor  
influencing students; perspective on using an authentication  
system in e-assessment*

9:40-10:00 S. SAEV (Sofia University, BULGARIA)  
*Impact of the assessment model in blended and face-to-face environment on students' perspective on cheating in exams*

### **Coffee Break**

10:30-10:50 D. BIMOVA (Technical University of Liberec, CZECH REPUBLIC)

*Planimetric Warm-ups for Developing Geometric Thinking*

10:50-11:10 M. DURCHEVA (Technical University of Sofia, BULGARIA)  
*Learning Process Enhancement through Self-testing and Self-assessment using the TeSLA System*

11:10-11:30 N. KOJOUHAROVA (Technical University of Sofia, BULGARIA)

*Advantages of Tesla project on-line tests in physics education at TU-Sofia*

11:30-11:50 J. GENOFF (Technical University of Sofia branch Plovdiv, BULGARIA)

*On The Need of Extremely High Precision Computation in Scientific Computer Simulations - Part I: How (To Estimate)?*

11:50-12:10 E. NIKOLOVA (Technical University of Sofia, BULGARIA)  
*Modeling Mathematical Logic Using MAPLE*

### **Lunch Break**

Hall 1: Special Session PDE

Chairperson: T. POPOV

16:00-16:20 S. POPOV (Ammosov North-Eastern Federal University, RUSSIA)

*Smooth solutions of parabolic equations with changing time direction*

16:20-16:40 A. POLOSIN (Lomonosov Moscow State University, RUSSIA)  
*On some boundary value problems with oblique derivative*

16:40-17:00 D. PIVOVAROVA (Lomonosov Moscow State University, RUSSIA)

*On sum of singular integral operators with non-Carleman shifts*

### **Coffee Break**

17:30-17:50 I. EGOROV (Ammosov North-Eastern Federal University, RUSSIA)

*Error estimate of the nonstationary Galerkin method for a higher order equation of mixed type*

- 17:50-18:10 I. TIKHONOVA (Ammosov North-Eastern Federal University, RUSSIA)  
*Faedo-Galerkin Method for Nonclassical Equation of Odd Order with Changing Time Direction*
- 18:10-18:30 E. EFIMOVA (Ammosov North-Eastern Federal University, RUSSIA)  
*Nonlocal Boundary Value Problem for a Parabolic Equation with a Changing Time Direction*

Hall 2: Math Analysis & Appl  
Chairperson: M. DURCHEVA

- 16:00-16:20 A. SHORIKOV (Ural Federal University, RUSSIA)  
*Algorithm for Solving of Two-Level Hierarchical Minimax Program Terminal Control Problem for Nonlinear Discrete-Time Dynamical System in the Presence of External Perturbations*
- 16:20-16:40 J. GENOFF (Technical University of Sofia branch Plovdiv, BULGARIA)  
*Trajectory Divergence Measures*
- 16:40-17:00 G. GEORGIEV (Konstantin Preslavsky University of Shumen, BULGARIA)  
*Generalized Offset Surfaces to a Torus*

**Coffee Break**

- 17:30-17:50 V. TODOROV (University of Architecture, Civil Engineering and Geodesy, BULGARIA)  
*Analytical vector functions II*
- 17:50-18:10 K. PEREV (Technical University of Sofia, BULGARIA)  
*Computation of system gramians for linear time varying systems*
- 18:10-18:30 N. DIMITROV (University of Ruse, BULGARIA)  
*Existence of periodic solutions for a nonlinear discrete  $p$ -Laplacian system*
- 18:30-18:50 I. KRALOV (Technical University of Sofia, BULGARIA)  
*An investigation of the influence of the geometrical parameters of a passive traffic noise barrier upon the noise reduction response*
- 18:50-19:10 I. KRALOV (Technical University of Sofia, BULGARIA)  
*COMSOL Modeling of Silicon Hall Microsensors*

### Hall 3: Software Innovations

Chairperson: P. BOROVSKA

- 16:00-16:20 S. ZHELEV (Technical University of Sofia, BULGARIA)  
*Data Analytics and Machine Learning with Java*
- 16:20-16:40 P. BOROVSKA (Technical University of Sofia, BULGARIA)  
*Intelligent Method for Adaptive In-silico Knowledge  
Discovery Based on Analysis of Genomic Data*
- 16:40-17:00 R. STANEV (Technical University of Sofia, Bulgaria)  
*Mathematical modelling of a hybrid system for distributed  
generation*

#### ***Coffee Break***

- 17:30-17:50 D. IVANOVA (Technical University of Sofia, BULGARIA)  
*Development of PaaS using AWS and Terraform for Medical  
Imaging Analytics*
- 17:50-18:10 D. IVANOVA (Technical University of Sofia, BULGARIA)  
*Scalable Framework for Adaptive In-silico Knowledge  
Discovery and Decision-Making of Genomic Big Bata*
- 18:10-18:30 G. VACHEVA (Technical University of Sofia, Bulgaria)  
*Mathematical modelling of a charge station for energy  
storage in micro- and nanogrids*
- 18:30-18:50 G. VACHEVA (Technical University of Sofia, Bulgaria)  
*Design consideration of electrical circuits with generalized  
nets*