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# **MASTER PROGRAM**

for

**EIGHTH INTERNATIONAL CONFERENCE  
*APPLICATION OF MATHEMATICS IN TECHNICAL AND NATURAL  
SCIENCES*  
ALBENA, JUNE 22-27, 2016**

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**TUESDAY, JUNE 21, 2016**

17:00-19:00      REGISTRATION  
Flamingo Grand Hotel – 3rd floor

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## WEDNESDAY, JUNE 22, 2016

- 07:30-08:30 REGISTRATION  
Flamingo Grand Hotel – 3rd floor
- 08:30-09:00 OPENING (Flamingo Grand Hall)
- 09:00-10:00 PLENARY LECTURE: Edward Kansa  
Title: *Radial Basis Functions: Accomplishments and Challenges*  
  
(Flamingo Grand Hall)  
Chair: Michail Todorov

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### 10:00-10:30 COFFEE BREAK

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Parallel Session APPLIED ANALYSIS  
(Flamingo Grand Hall)  
Chair: Edward Kansa

- 10:30-11:00 Speaker: Predrag Rajkovic  
Title: *On Analogs of Number  $\pi$  in  $q$ -Calculus*
- 11:00-11:30 Speaker: Murat Sadiku  
Title: *Applying Transformations for Accelerating the Convergence of Trigonometric Series*
- 11:30-12:00 Speaker: Bianca-Renata Satco/Gabriel Dimitriu  
Title: *Urysohn Measure Driven Integral Equations in the Space of Bounded Variation Functions*

Parallel Session SCIENTIFIC COMPUTING  
(Flamingo Grand Jaco Hall)  
Chair: Nevena Ilieva

- 10:30-11:00 Speaker: Brenton LeMesurier  
Title: *PDE Models for Pulses in Binary Wave Guide Arrays*
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11:00-11:30 Speaker: Denitca Grigorova  
Title: *EMcorrProbit R Package*

11:30-12:00 Speaker: Elena Lilkova  
Title: *Metadynamics Studies of Large Proteins*

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12:00-14:00 LUNCH

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14:00-15:00 Parallel Session MATHEMATICAL PHYSICS AND  
TRANSPORT PROCESSES  
(Flamingo Grand Hall)  
Chair: Alexandre Fedoseyev

14:00-14:30 Speaker: Constance Schober  
Title: *JONSWAP Rogue Waves Over Non-Constant  
Backgrounds*

14:30-15:00 Speaker: Alexei Taiursky  
Title: *Spatial Nonlinear Absorption of Alfvén Waves by the  
Dissipative Plasma*

15:00-16:00 Parallel Session APPLIED ANALYSIS  
(Flamingo Grand Hall)  
Chair: Alexandre Fedoseyev

15:00-15:30 Speaker: Iliya Bluskov  
Title: *Finding Discrete Structures via Problem Dependent  
Optimization Data*

15:30-16:00 Speaker: Ozer Ozen  
Title: *A Note On Fundamental Units in Some Type of Real  
Quadratic Fields*

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14:00-16:00 Parallel Session SCIENTIFIC COMPUTING  
(Flamingo Grand Jaco Hall)  
Chair: Brenton LeMesurier

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- 14:00-14:30 Speaker: Nadezhda Afanasyeva  
Title: *Numerical Solution of the Thermal Influence of Oil Well Cluster on Permafrost*
- 14:30-15:00 Speaker: Kateryna Nesvit  
Title: *Measurement of Similarity Users and Items by Feedbacks and Tags for Recommendation System*
- 15:00-15:30 Speaker: Nevena Ilieva  
Title: *Are There Folding Pathways in the Functional Stages of Intrinsically Disordered Proteins?*
- 15:30-16:00 Speaker: Konstantinos Liolios  
Title: *Numerical Models of Ion-acoustic Collisionless Shock*

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16:00-16:30 COFEE BREAK

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16:30-18:00 Parallel Session SCIENTIFIC COMPUTING  
(Flamingo Grand Hall)  
Chair: Ivanka Zheleva

16:30-17:00 Speaker: Ozer Ozen  
Title: *Common Fixed Point Theorems in  $C^*$ -Algebra Valued  $b$ -Metric Spaces*

17:00-17:30 Speaker: Maya Stoimenova  
Title: *Stochastic Univariate and Multivariate Time Series Analysis of PM<sub>2.5</sub> and PM<sub>10</sub> Air Pollution: a Comparative Case Study for Plovdiv and Asenovgrad, Bulgaria*

17:30-18:00 Speaker: Ilmars Iltins -cancelled  
Title: *Hydrodynamic Instability of a Convective Flow in an Annulus Generated by Heat Sources in a Chemically Reacting Fluid*

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16:30-18:00 Parallel Session SCIENTIFIC COMPUTING  
(Flamingo Grand Jaco Hall)

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Chair: Vasily Vasilyev

16:30-17:00      Speaker: Petr Sivtsev  
Title: *The Numerical Solving of the Navier-Stokes Equations for Real Gas*

17:00-17:30      Speaker: Stanislav Harizanov  
Title: *Hybrid Segmentation of 3D CT Data, Incorporating Various Physical Characteristics of the Scanned Object*

17:30-18:00      Speaker: Vladimir Vinnikov - cancelled  
Title: *Numerical Simulation of Meteoroid Dark Flight Trajectory*

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20:00              WELCOME PARTY – Bailando Bar

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**THURSDAY, JUNE 23, 2016**

08:30-09:30 PLENARY LECTURE: Alexander Kurganov  
Title: *Central Schemes: A Powerful Black-Box Solver for Nonlinear Hyperbolic PDEs*

(Flamingo Grand Hall)  
Chair: Michail Todorov

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09:30-10:00 COFEE BREAK

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10:00-12:00 On-Line Special Session OSTROGRADSKY-215  
(Flamingo Grand Hall)  
Chair: Victor Lyashenko

10:00-10:30 Speaker: Victor Lyashenko  
Title: *Semi-rigidity vs. Flexibility in Collective Variables Preselection for Mathematical Models of Thermal Processes in the Spherical Area*

10:30-11:00 Speaker: Andrii Safonyk  
Title: *Mathematical Modeling of Wastewater Treatment from Multicomponent Pollution by Using Microporous Particles*

11:00-11:30 Speaker: Igor Astionenko  
Title: *Hierarchy of Bases for Serendipity Finite Element with the Biquadratic Interpolation*

11:30-12:00 Speaker: Oksana Voloshina  
Title: *Risks Assessment Concept as a Factor for Managerial or Investment Decisions*

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10:00-12:00 Parallel Session BIOMATHEMATICS  
(Flamingo Grand Jaco Hall)  
Chair: Alexander Kurganov

10:00-10:30 Speaker: Gabriel Dimitriu

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Title: *Numerical Approach of an Optimal Control Problem for a Diffusive Ecosystem with Two Competing Preys and One Predator*

10:30-11:00 Speaker: Dorota Bielinska-Waz  
Title: *A New Alignment-Free Method of Comparison of DNA Sequences*

11:00-11:30 Speaker: Piotr Waz  
Title: *A New Method in Graphical Bioinformatics*

11:30-12:00 Speaker: Evdokia Slepukhina  
Title: *Noise-Induced Bursting in Rulkov Model*

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12:00-14:00 LUNCH

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Flamingo Grand Hall  
Chair: Michail Todorov

14:00-14:45 KEYNOTE LECTURE: Petr Vabishchevich  
Title: *Numerical Simulation of the Stress-Strain State of the Dental System*

14:45-15:30 KEYNOTE LECTURE: Vladimir Shaydurov  
Title: *The Numerical Solving of the Navier-Stokes Equations for Real Gas*

On-line Special Session OSTROGRADSKY-215  
(Flamingo Grand Hall)  
Chair: Tetiana Hryhorova

15:30-16:00 Speaker: Irina Hvozdeva  
Title: *The Solution of the Volterra Integral Equations of the Second Kind and Their Discrete Analogues on the Basis of Equation Linking the Kernel and the Resolvent*

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Parallel Session BIOMATHEMATICS

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(Flamingo Grand Jaco Hall)  
Chair: Vladimir Shaydurov

15:30-16:00 Speaker: Mikhail Antonov  
Title: *Molecular Dynamics Simulation of the Structure and Dynamics of 5-HT<sub>3</sub> Serotonin Receptor*

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16:00-16:30 COFEE BREAK

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16:30-18:00 On-line Special Session OSTROGRADSKY-215  
(Flamingo Grand Hall)  
Chair: Tetiana Hryhorova

16:30-17:00 Speaker: Elena Kobilskaya  
Title: *Methods for Solving Inverse Nonlocal Problems for Parabolic Equations*

17:00-17:30 Speaker: Victor Olevsky  
Title: *Analytic Approximation of Periodic Ateb Functions via Elementary Functions in Nonlinear Dynamics*

17:30-18:00 Speaker: Yuliia Olevska  
Title: *Mathematical Models of Magnetite Desliming for Automated Quality Control Systems*

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16:30-18:00 Parallel Session BIOMATHEMATICS  
(Flamingo Grand Jaco Hall)  
Chair: Petr Vabishchevich

16:30-17:00 Speaker: Ekaterina Ekaterinchuk  
Title: *Stochastic Generation of Spatial Patterns in Brusselator*

17:00-17:30 Speaker: Evdokia Slepukhina  
Title: *Analysis of Stochastic Phenomena in 2D Hindmarsh-Rose Neuron Model*

17:30-18:00 Speaker: Anna Antonova/Michail Todorov  
Title: *A Comparative Analysis of Goodwin's Business Cycle*

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*Models with Continuously Distributed Lags*

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**FRIDAY, JUNE 24, 2016**

08:30-09:30 Flamingo Grand Hall  
Chair: Michail Todorov

PLENARY LECTURE: Igor Tsukerman  
Title: *Effective Medium Theories from the 19th to the 21st Century: Finite Samples, Interface Boundaries, Non-Asymptotic and Nonlocal Approximations*

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09:30-10:00 COFFEE BREAK

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10:00-12:00 Parallel Session CONTINUUM MECHANICS  
Flamingo Grand Hall  
Chair: Nectarios Papanicolaou

10:00-10:30 Speaker: Vladimir Sadovsky  
Title: *Modeling of Fan Formation in a Shear Rupture Head on the Basis of Singular Solutions of Plane Elasticity*

10:30-11:00 Speaker: Evgeny Chentsov  
Title: *Analysis of Oscillation Processes in a Blocky Medium by Means of Discrete and Continuous Models*

11:00-11:30 Speaker: Oxana Sadovskaya  
Title: *Method of Superposition of Dislocations for Finding Stress-Strain State around Fan-Shaped Structure in a Brittle Rock*

11:30-12:00 Speaker: Dobri Dankov  
Title: *Thermo-Acoustic Waves in Rarefied Gas between Two Coaxial Cylinders in the Temperature Suddenly Change of the Outer Cylinder*

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POSTER SESSION DURING THE COFFEE BREAK  
(Flamingo Grand Hall)

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Marios Christou

*On-axis Electromagnetic Scattering from a Sub-Wavelength Aperture on a Conducting Screen*

Ivanka Zheleva, Margarita Filipova

*Atmospheric Characteristics Statistic Study of Rousse Region, Bulgaria*

Tsvetanka Kovacheva, etc.

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12:00-13:00 LUNCH

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14:15-20:30

EXCURSION BY BUS TO THE GOVERNMENTAL  
RESIDENCE OF EUXINOGRADE AND THE CLAM FARM  
IN THE GULF OF DALBOKA

## SATURDAY, JUNE 25, 2016

08:30-09:30      PLENARY LECTURE (informal): Alexander Kurganov  
Title: *Central-Upwind Schemes for Shallow Water Models*  
  
(Flamingo Grand Hall)  
Chair: Michail Todorov

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09:30-10:00      COFEE BREAK

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10:00-12:00      Special Session COMPUTATIONAL FINANCE  
(Flamingo Grand Hall)  
Chair: Igor Tsukerman

10:00-10:30      Speaker: Zuzana Buckova  
Title: *Advanced Numerical Methods in Finance for Black-Scholes Model*

10:30-11:00      Speaker: Pedro Polvora  
Title: *Derivative Pricing in Markets with Transaction Costs*

11:00-11:30      Speaker: Andre Ribeiro  
Title: *Pricing and Hedging Correlation Swaps with a 2-Factor Model*

11:30-12:00      Speaker: Avi Messica  
Title: *A Simple Low Computation Intensity Model for Approximating the Distribution Function of a Sum of Non-Identical Lognormals for Financial Applications*

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10:00-12:00      Parallel Session CONTINUUM MECHANICS  
(Flamingo Grand Jaco Hall)  
Chair: Vladimir Sadovsky

10:00-12:00      Speaker: Anatoly Filippov  
Title: *Comparing Two New Models for Asymmetry of Current–*

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*Voltage Characteristics of Modified Ion-Exchange Membranes*

10:30-11:00 Speaker: Aleksei Taiursky  
Title: *Solitons in Two-Fluid MHD with Electron Inertia*

11:00-11:30 Speaker: Maria Varygina  
Title: *Numerical Modeling of Wave Propagation Processes in Micropolar Rods and Thin Plates*

11:30-12:00 Speaker: Sonya Tabakova - cancelled  
Title: *Velocity and Shear Rate Estimates of Some Non-Newtonian Oscillatory Flows in Tubes*

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12:00-14:00 LUNCH

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Session MATHEMATICAL PHYSICS AND TRANSPORT PROCESSES

(Flamingo Grand Hall)

Chair: Vladimir Gerdjikov

14:00-14:45 KENOTE LECTURE: Annalisa Calini  
Title: *Stability of Vortex Filaments*

14:45-15:30 KENOTE LECTURE: Ivan Koprinkov/Michail Todorov  
Title: *Dynamics of High-intensity Ultrashort Light Pulses at Some Basic Propagation Regimes*

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15:30-16:00 Parallel Session SCIENTIFIC COMPUTING  
(Flamingo Grand Hall)  
Chair: Todor Gurov

15:30-16:00 Speaker: Christoph Schmuedderich  
Title: *The Method of Kinematic Elements in Geotechnics – New Developments and Applications*

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15:30-16:00 Special Session COMPUTATIONAL FINANCE  
(Flamingo Grand Jaco Hall)  
Chair: Zuzana Buckova

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15:30-16:00      Speaker: Igor Kossaczky  
Title: *Modifications of PCPT Method for HJB Equation*

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16:00-16:30      COFEE BREAK

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16:30-18:00      Parallel Session SCIENTIFIC COMPUTING  
(Flamingo Grand Hall)  
Chair: Todor Gurov

16:30-17:00      Speaker: Stanislav Stoykov  
Title: *Nonlinear Dynamical Analysis of Plates by Efficient Parallel Algorithms*

17:00-17:30      Speaker: Alexander Vasilyev  
Title: *Solution of the Neutronics Code Dynamic Benchmark by Finite Element Method*

17:30-18:00      Speaker: Rosangela Sviercoski  
Title: *Description of Data Reanalysis of Discharge and Gauge Height for the Amazon River Basin*

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16:30-18:00      Special Session COMPUTATIONAL FINANCE  
(Flamingo Grand Jaco Hall)  
Chair: Zuzana Buckova

16:30-17:00      Speaker: Zuzana Buckova/Igor Tsukerman  
Title: *Traditional vs. Trefftz Difference Schemes for the Black-Scholes Equation*

17:00-17:30      Parallel Session CONTINUOUS MECHANICS  
(Flamingo Grand Jaco Hall)  
Chair:

Speaker: Samir Habibi - cancelled  
Title: *Exploitation of Statistical Tools to Determine the Law Behavior of Materials by Nanoindentation*

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17:30-18:00

Parallel Session APPLIED ANALYSIS  
(Flamingo Grand Jaco Hall)

Chair:

Speaker: Ivanka Stamova - cancelled

Title: *On the Stability and Control Strategies for Impulsive  
Lotka-Volterra Systems of Fractional Order*

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20:00

BANQUET DINNER, RESTAURANT OF RAI (PARADISE).  
MEETING POINT RECEPTION OF FLAMINGO GRAND  
HOTEL, 19:45

## SUNDAY, JUNE 26, 2016

- 08:30-09:30      PLENARY LECTURE: Petia Radeva  
Title: *Recognizing Food through Deep Learning and Egocentric Vision*
- (Flamingo Grand Hall)  
Chair: Michail Todorov
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- 09:30-10:00      COFEE BREAK
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- 10:00-11:00      Parallel Session MATHEMATICAL PHYSICS AND  
TRANSPORT PROCESSES  
(Flamingo Grand Hall)  
Chair: Petia Radeva
- 10:00-10:30      Speaker: Nicoleta-Corina Babalic  
Title: *Super-Solitons and Mixed Solutions for Defocusing Super-Gardner Equation*
- 10:30-11:00      Speaker: Anna Efimova  
Title: *Numerical Models of Ion-acoustic Collisionless Shock*
- 11:00-11:30      Speaker: Vladimir Gerdjikov  
Title: *Manakov Soliton Trains: External Potentials and Cross-Modulation Effects. Part I*
- 11:30-12:00      Speaker: Michail Todorov  
Title: *Manakov Soliton Trains: External Potentials and Cross-Modulation Effects. Part II*
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- 10:00-12:00      Parallel Session SCIENTIFIC COMPUTING  
(Flamingo Grand Jaco Hall)  
Chair: Anatoly Filippov
- 10:00-10:30      Speaker: Valentin Gushchin  
Title: *Free Surface Fluid Flows Modeling*
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- 10:30-11:00      Speaker: Teodor Grigorie  
Title: *Numerical Study of an Error Model for a Strap-down INS*
- 11:00-11:30      Speaker: Sergei Stepanov  
Title: *Numerical Simulation of the Convective Heat Transfer on High-Performance Computing Systems*
- 11:30-12:00      Speaker: Nectarios Papanicolaou  
Title: *A Discontinuous Galerkin Finite Element Method for High-Prandtl Number Non-Fourier Convection*

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12:00-14:00 LUNCH

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- 14:00-16:00      Parallel Session NUMERICAL METHODS  
(Flamingo Grand Hall)  
Chair: Vladimir Shaydurov
- 14:00-14:30      Speaker: Vasily Vasilyev  
Title: *On the Numerical Solution of the Boundary Inverse Problem for a Parabolic Equation*
- 14:30-15:00      Speaker: Maria Vasilyeva  
Title: *Generalized Multiscale Finite Element Method (GMsFEM) for Non-Newtonian Fluid Flow in Perforated Domains*
- 15:00-15:30      Speaker: Svetlana Tikhovskaya  
Title: *Polynomial Interpolation of the Function of Two Variables with Large Gradients in the Parabolic and Exponential Boundary Layers*
- 15:30-16:00      Speaker: Vladimir Ostapenko  
Title: *On the Monotonicity of Multidimensional Difference Schemes*
- 14:00-15:30      Parallel Session COMPUTER SCIENCE, APPLIED ANALYSIS

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(Flamingo Grand Jaco Hall)  
Chair: Vladimir Gerdjikov

14:00-14:30 Speaker: Katarzyna Wasielewska  
Title: *Agent in Grids Extended to Clouds*

14:30-15:00 Speaker: Mikhail Gusev  
Title: *Application of Penalty Function Method to Computation of Reachable Sets for Control Systems with State Constraints*

15:00-15:30 Speaker: Roumen Anguelov  
Title: *Asymmetric Metric: Application to Dealing with Uncertainty*

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16:00-16:30 COFEE BREAK

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16:30-17:30 Contributed Session SCIENTIFIC COMPUTING  
(Flamingo Grand Hall)  
Chair: Vladimir Ostapenko

16:30-17:00 Speaker: Lyudmila Vshivkova  
Title: *Hybrid Numerical Model of Shock Waves in Collisionless Plasma*

17:00-17:30 Speaker: Grigory Parshikov  
Title: *On Some Questions in Computer Modeling of the Reachability Sets Constructing Problems*

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## MONDAY JUNE 27, 2016

08:30-09:30      PLENARY LECTURE: Alexandre Fedoseyev  
Title: *A Universal Framework for Non-deteriorating Time-domain Numerical Algorithms in Maxwell's Electrodynamics*  
  
(Flamingo Grand Hall)  
Chair: Michail Todorov

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09:30-10:00      COFEE BREAK

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10:00-12:00      Session NUMERICAL METHODS  
(Flamingo Grand Hall)  
Chair: Alexandre Fedoseyev

10:00-10:30      Speaker: Tatiana Filippova  
Title: *Estimates of Reachable Sets of Impulsive Control Problems with Special Nonlinearity*

10:30-11:00      Speaker: Alexander Vyatkin  
Title: *The Conservative Semi-Lagrangian Method for the Advection Problem with the Bogner-Fox-Schmit Elements on Rectangles*

11:00-11:30      Speaker: Ekaterina Dementyeva  
Title: *The Inexact Uzawa - Conjugate Gradient Method for the Stokes Problem for Incompressible Fluid*

11:30-12:00      Speaker: Venelin Todorov  
Title: *Monte Carlo methods for Numerical Integration for European Option Pricing*

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10:00-10:30      Session SCIENTIFIC COMPUTING  
(Flamingo Grand Jaco Hall)  
Chair: N

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10:00-10:30 Speaker: Elena Zemlyanaya  
Title: *Numerical Study of a Model of Stacked Long Josephson Junctions*

10:30-11:00 Session COMPUTER SCIENCE  
(Flamingo Grand Jaco Hall)  
Chair: Aneta Karaivanova

10:30-11:00 Atanas Radenski/Todor Gurov  
*Big Data Platforms, Systems and Applications: Experience from Academia*

11:00-11:30 Session APPLIED ANALYSIS  
(Flamingo Grand Jaco Hall)  
Chair: Vladimir Gerdjikov

11:00-11:30 Speaker: Julian Dimitrov  
Title: *Functional Analysis of Recoverability from Discrete Presented Continuous Dependence*

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12:00-14:00 LUNCH

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14:00-15:00 Parallel Session NUMERICAL METHODS  
(Flamingo Grand Hall)  
Chair: Michail Todorov

14:00-14:30 Speaker: Eugenia Karepova  
Title: *New Hermitian Finite Elements on Rectangles with Useful Properties for Spectral and Parabolic Problems*

14:30-15:00 Speaker: Elena Kostousova  
Title: *On Estimating Reachable Sets for Multi-Agent Motion: Discrete-Time Dynamic Systems*

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14:00-15:00 Parallel Session COMPUTER SCIENCE  
(Flamingo Grand Jaco Hall)  
Chair: Vladimir Gerdjikov

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14:00-14:30	Speaker: Aneta Karaivanova Title: <i>On the Parallelization Approaches for Intel MIC Architecture</i>
14:30-15:00	Speaker: Todor Gurov Title: <i>Estimating Population Size of the Bulgarian Brown Bear Population</i>
15:00-15:30	COFEE BREAK
15:30	RECAPITULATION AND CLOSING SESSION OF THE CONFERENCE (Falmingo Grand Hall)

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