MASTER PROGRAM

for

SEVENTH INTERNATIONAL CONFERENCE
APPLICATION OF MATHEMATICS IN TECHNICAL AND NATURAL SCIENCES
ALBена, JUNE 28-JULY 3, 2015

SATURDAY, JUNE 27, 2015

17:00-19:00  REGISTRATION
             Flamingo Grand Hotel – 3rd floor
SUNDAY, JUNE 28, 2015

07:30-08:30  REGISTRATION
            Flamingo Grand Hotel – 3rd floor

08:30-09:00  OPENING (Flamingo Grand Hall)

09:00-10:00  PLENARY LECTURE: Alexander Samsonov
            (Flamingo Grand Hall)
            Chair: Michail Todorov
            Title: *Bulk Solitary Waves in Elastic Solids*

10:00-10:30 COFFEE BREAK

10:00-10:30  SPECIAL SESSION ADVANCED MATERIAL
            CHARACTERIZATION, MODELLING, AND NUMERICAL SIMULATION*
            (Flamingo Grand Hall)
            Chair: Maria Datcheva

10:30-11:15  KEYNOTE LECTURE: Svetozar Margenov
            Title: *Robust AMLI PCG Iterative Solution Methods for Problems with Strongly Heterogeneous Coefficients*

11:15-12:00  KEYNOTE LECTURE: Anatoly Filippov
            Title: *Characterization of Perfluorinated Cation-exchange Membranes MF-4SC Surface Modified with Halloysite Nanotubes*

12:00-14:00  LUNCH

14:00-15:30  SPECIAL SESSION ADVANCED MATERIAL
            CHARACTERIZATION, MODELLING, AND NUMERICAL SIMULATION
            (Flamingo Grand Hall)
            Chair: Svetozar Margenov
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<th>Speaker</th>
<th>Title</th>
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<tr>
<td>14:00-14:30</td>
<td>Parallel Session NUMERICAL METHODS</td>
<td>Nevena Ilieva</td>
<td>Solitons and Protein Folding: An in silico Experiment</td>
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<tr>
<td>14:30-15:00</td>
<td>Parallel Session NUMERICAL METHODS</td>
<td>Rosangela Sviercoski</td>
<td>Upscaling the Coupled Water Flow and Heat Transfer near Subsurface - Comparison between Numerical and Field Data</td>
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<tr>
<td>15:00-15:30</td>
<td>Parallel Session NUMERICAL METHODS</td>
<td>Ivan Georgiev</td>
<td>Advance Characterisation of Structure and Properties of Composites</td>
</tr>
<tr>
<td>14:00-15:30</td>
<td>Parallel Session NUMERICAL METHODS</td>
<td>Stefka Dimova</td>
<td>Numerical Methods for Hamiltonian Systems: Implementation and Comparison</td>
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<tr>
<td>14:30-15:00</td>
<td>Parallel Session NUMERICAL METHODS</td>
<td>Svetlana Tikhovskaya</td>
<td>Solving a Semilinear Convection-diffusion Problem by a Two-grid Method with Richardson Extrapolation</td>
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<tr>
<td>15:00-15:30</td>
<td>Parallel Session NUMERICAL METHODS</td>
<td>Alexander Vyatkin</td>
<td>The Semi-Lagrangian Algorithm Based on an Integral Transformation for Three-Dimensional Advection Problems</td>
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<tr>
<td>15:30-16:00</td>
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<td>COFEES BREAK</td>
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<tr>
<td>16:00-17:30</td>
<td>Parallel Session SCIENTIFIC COMPUTING</td>
<td>Desislava Voynikova</td>
<td>Modeling the Effect of Meteorological Factors on SO2 and PM10 Concentrations in SARIMA method and Model</td>
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</table>
Refinement

16:30-17:00  Speaker: Andreas Savva  
Title: *A Surface Generator*

17:00-17:30  Speaker: Atanas Ivanov  
Title: *Using PCA and General Path Seeker Regression for Investigation of Air Pollution and CO Modeling*

17:30-18:00  Parallel Session APPLIED ANALYSIS & MATHEMATICAL PHYSICS  
(Flamingo Grand Hall)

17:30-18:00  Speaker: Veliko Donchev  
*On the Compositions of Rotations*

16:00-17:30  Parallel Session NUMERICAL METHODS  
(Flamingo Grand Jaco Hall)  
Chair: Vladimir Gerdjikov

16:00-16:30  Speaker: Nectarios Papanicolaou  
Title: *High-Order Discontinuous Galerkin Methods for Coupled Thermoconvective Flows under Gravity Modulation*

16:30-17:00  Speaker: Mehrdad D. Tirani  
Title: *Numerical Solution of Differential-difference Equations in Large Intervals Using a Taylor Collocation Method*

17:00-17:30  Speaker: Majid Kajani  
Title: *A Direct Multi-step Legendre-Gauss Collocation Method for High-order Volterra Integro-differential Equation*

20:00  WELCOME PARTY – Ganvie Beach Club
The special session “Advanced Material Characterization, Modelling, and Numerical Simulation” is supported by FP7 project AComln, grant agreement 316087 and by the Bulgarian National Science Fund under grant T02/22.
MONDAY, JUNE 29, 2015

08:30-09:30  PLENARY LECTURE: Vladislav Pukhnachev
Title: Mathematical Models of Polymer Solutions Motion and Their Symmetries
(Flamingo Grand Hall)
Chair: Michail Todorov

09:30-10:00 COFEE BREAK

10:30-12:00  Parallel Session APPLIED ANALYSIS & MATHEMATICAL PHYSICS
(Flamingo Grand Hall)
Chair: Vladislav Pukhnachev

10:00-10:30  Speaker: Nikolay Kutev
Title: Generalized Nehari Functional and Global Solvability of Boussinesq Equation

10:30-11:00  Speaker: Natalia Kolkovska
Title: Numerical Computation of the Critical Energy Constant for Two-dimensional Boussinesq Equations

11:00-11:30  Speaker: Marios Christou
Title: A Sixth Order Generalized Boussinesq Type Equation using Hirota's Method

11:30-12:00  Speaker: Martin Lints
Title: Solitary Waves for Non-Destructive Testing Applications: Delayed Nonlinear Time Reversal Signal Processing Optimization

10:00-11:30  Parallel Session APPLIED PHYSICS
(Flamingo Grand Jaco Hall)
Chair: Sonya Tabakova

10:00-10:30  Speaker: Astrid Rekker
Title: Influence of the Basset Force on the Resonant Behavior
of an Oscillator with Fluctuating Frequency

10:30-11:00  Speaker: Katrin Laas  
Title: Resonance of Brownian Vortices in Viscoelastic Shear Flows

11:00-11:30  Speaker: Leonid Turchak - cancelled  
Title: Modeling of the Interaction of Meteoroids with the Martian Atmosphere

12:00-14:00 LUNCH

Session BIOMATHEMATICS  
(Flamingo Grand Hall)  
Chair: Nikolay Kutev

14:00-14:45  KEYNOTE LECTURE: Roumen Anguelov  
Title: On the Stability of Equilibria in Cross-diffusion Systems

Session NUMERICAL METHODS  
(Flamingo Grand Hall)  
Chair: Nikolay Kutev

14:45-15:30  KEYNOTE LECTURE: Bojan Popov  
Title: Recent Developments in Entropy Viscosity

15:30-16:00  COFEE BREAK

16:00-17:30  Parallel Session APPLIED ANALYSIS & MATHEMATICAL PHYSICS  
(Flamingo Grand Hall)  
Chair: Stefka Dimova

16:00-16:30  Speaker: Kenji Tomoeda  
Title: Appearance of Repeated Support Splitting and Merging Phenomena in a Porous Media Equation with Absorption
16:30-17:00 Speaker: Ivan Koprinkov
Title: Robust Ultrashort Laser Pulse Formation in Ionization Free Regime Propagation

17:00-17:30 Speaker: Ivan Raykov
Title: More Applications of Fitzpatrick Functions for Solving Optimization Problems

16:00-16:30 Parallel Session NUMERICAL METHODS
(Flamingo Grand Jaco Hall)
Chair: Ivanka Zheleva

Speaker: Masoud Allame
Title: An Appropriate Method for Eigenvalues Approximation of Sixth-order Sturm-Liouville Problems by Using Integral Operation Matrix over the Chebyshev Polynomials

16:30-17:30 Parallel Session COMPUTER SCIENCE
(Flamingo Grand Jaco Hall)
Chair: Ivanka Zheleva

Speaker: Dimitar Dimitrov
Title: Evaluation of Stochastic Algorithms for Financial Mathematics Problems from Point of View of Energy-efficiency

17:00-17:30 Speaker: Katarzyna Wasielewska
Title: Multicriterial Analysis and Ontologically Represented Information
TUESDAY, JUNE 30, 2015

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

PLENARY LECTURE: Peter Minev
Title: *High-order Artificial Compressibility for the Navier-Stokes Equations*

09:30-10:00 COFFEE BREAK

10:00-12:00 Parallel Session CONTINUUM MECHANICS
Flamingo Grand Hall
Chair: Peter Minev

10:00-10:30 Speaker: Vladimir Sadovskii
Title: *Mathematical Modeling of Deformation of a Porous Medium, Considering Its Strengthening Due to Pore Collapse*

10:30-11:00 Speaker: Sonya Tabakova
Title: *Nonlinear Drainage of Some Non-Newtonian Free Films*

11:00-11:30 Speaker: Oxana Sadovskaya
Title: *Numerical Implementation of Mathematical Model of the Dynamics of a Porous Medium on Supercomputers of Cluster Architecture*

11:30-12:00 Speaker: Yonko Stoynov
Title: *The Influence of Inhomogeneity on the Behavior of Cracked Magneto-electro-elastic Materials*

12:30-14:00 LUNCH

13:15-18:30 EXCURSION BY THE ALI BABA YACHT TO THE GULF OF BYLATA LAGUNA. MEETING POINT THE RECEPTION OF FLAMINGO GRAND HOTEL
WEDNESDAY, JULY 1, 2015

05:29  Meeting the sunrise on the beach

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

            PLENARY LECTURE: Vladimir Shaydurov
            Title: *Mathematical and Numerical Modeling of the Pass of an Asteroid-Comet Body through the Earth's Atmosphere*

09:30-10:00  COFEE BREAK

10:00-12:00  Special Session ADVANCED MATERIAL CHARACTERIZATION, MODELLING, AND NUMERICAL SIMULATION* (Flamingo Grand Hall)
              Chair: Ivan Georgiev

10:00-10:30  Speaker: Elham Mahmoudi
            Title: *Optimal Sensor Location for Parameter Identification in Soft Clay*

10:30-11:00  Speaker: Elena Lilkova
            Title: *Molecular Modelling of the Interactions of Heparin-Derived Oligosaccharides, Human Interferon Gamma and Its Extracellular Receptors*

11:00-11:30  Speaker: Tzvetan Ostromsky
            Title: *Calculation of Geodesic Polygons with Strongly Dominant Angle Error*

11:30-12:00  Speaker: Evgeni Koytchev
            Title: *Micromechanical (Microhardness) Testing of the Dentin Hybrid Zone Formed by Different Types of Adhesive Systems in Sound Human Dentin*

10:00-10:30  Parallel Session CONTINUUM MECHANICS
10:00-12:00 Speaker: Oxana Frolovskaya
Title: Numerical Investigation of Unsteady Axisymmetric Stagnation-Point Flow

10:30-11:00 Speaker: Aleksei Taiursky
Title: Nonlinear Absorption of Alfven Wave in Dissipative Plasma

11:00-11:30 Speaker: Dobri Dankov
Title: Transient Heat Transfer in Viscous Rarefied Gas between Concentric Cylinders. Effect of Curvature

11:30-12:00 Speaker: Jasmina Kojouharova
Title: ANSYS CFX Wall-Function Approach for Modeling of Fully Separated Flow past a Circular Cylinder: Problems and Simulation Practical Guide

12:00-14:00 LUNCH

Session NUMERICAL METHODS
(Flamingo Grand Hall)
Chair: Natalia Kolkovska

14:00-14:45 KENOTE LECTURE: Raytcho Lazarov
Title: Recent Advances in Numerical Methods for Fractional Differential Equations

Special Session ADVANCED MATERIAL CHARACTERIZATION, MODELLING, AND NUMERICAL SIMULATION
(Flamingo Grand Hall)
Chair: Roumen Iankov

14:45-15:30 KENOTE LECTURE: Gabriella Bolzon
Title: Experimental and Computing Strategies in Advanced
# Material Characterization Problems

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(Flamingo Grand Hall)  
Chair: Roumen Iankov |
| 16:00-16:30| Speaker: Maria Datcheva  
Title: Nanomechanical Testing of Thin Composite Layers - Application to Pd-In Electrochemically Deposited Thin Films |
| 16:30-17:30| Speaker: Sabina Cherneva  
Title: Investigation of the Influence of the Concentrations of Sn in Electrochemically Deposited CuSn Alloy Films on Their Mechanical Properties |
| 17:00-17:30| Speaker: Mirona Mironova/M. Ivanova  
Title: Study of Fiber-Reinforcement Self-Compacting Concretes |

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(Flamingo Grand Jaco Hall)  
Chair: Raytcho LazarovE |
| 16:00-16:30| Speaker: Alexander Vyatkin  
Title: Some Features of CUDA Implementation of Semi-Lagrangian Method for an Advection Problem |
| 16:30-17:00| Speaker: Ekaterina Dementyeva  
Title: The Numerical Solution of Navier-Stokes Equations for Viscous Incompressible Fluid by Semi-Lagrangian Approximation in the Finite Element Method |
| 17:00-17:30| Speaker: Igor Kireev  
Title: Reduction of Linear Hamiltonian Systems of Ordinary Differential Equations |
19:00

BANQUET DINNER, INN OF IVANCHOV, ST.ST.CONSTANTINE AND HELENA. MEETING POINT RECEPTION OF FLAMINGO GRAND HOTEL

* The special session “Advanced Material Characterization, Modelling, and Numerical Simulation” is supported by FP7 project AComln, grant agreement 316087 and by the Bulgarian National Science Fund under grant T02/22
THURSDAY, JULY 2, 2015

08:30-09:30  PLENARY LECTURE: Jianzhong Su
Title: Modeling, Simulation and PDE Stability Analysis for Foreign Body Fibrotic Reactions - cancelled

08:30-09:30  Poster Session
(Flamingo Grand Hall)

Anna Antonova, *Dynamics of the Driven Goodwin Business Cycle Equation*

Ivan G. Ivanov, *Numerical Solvers to the Stabilizing Solution of Perturbed Algebraic Riccati Equations in LQ Zero-sum Games*

Anna Lecheva, *Fluid Flow Structure around the Mixer in a Bioreactor with Mechanical Stirring*

Ivanka Zheleva, *Numerical Study of Fluid Motion in Cylindrical Reactor with Two Mixers*

Snezhana Kostova, *LQR Problem of Linear Discrete Time Systems with Nonnegative State Constraints*

09:30-10:00  COFEE BREAK

10:00-11:00  Parallel Session BIOMATHEMATICS
(Flamingo Grand Hall)
Chair: Nikolay Kutev

10:00-10:30  Speaker: Neeme Lumi
Title: *Sign Reversals of the Output Autocorrelation Function for the Stochastic Bernoulli-Verhulst Equation*

10:30-11:00  Speaker: Gabriel Dimitriu
Title: *Numerical Approach of an Optimal Control Problem for a Model of Tissue Invasion by Solid Tumours*
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<td>Parallel Session APPLIED ANALYSIS &amp; MATHEMATICAL PHYSICS</td>
<td>(Flamingo Grand Hall) Chair: Nikolay Kutev</td>
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<td>11:00-11:30</td>
<td>Speaker: Vladimir Gerdjikov</td>
<td>Title: <em>Manakov Soliton Trains and External Potentials: Criterium of Adiabaticity. Part I</em></td>
</tr>
<tr>
<td>11:30-12:00</td>
<td>Speaker: Michail Todorov</td>
<td>Title: <em>Manakov Soliton Trains and External Potentials: Criterium of Adiabaticity. Part II</em></td>
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<td>(Flamingo Grand Jaco Hall) Chair: Ivan Georgiev</td>
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<td>10:00-10:30</td>
<td>Speaker: Ivan Bazhlekov</td>
<td>Title: <em>Numerical Modeling of Biosurfactants in Multiphase Flows</em></td>
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<td>10:30-11:00</td>
<td>Speaker: Masahisa Tabata</td>
<td>Title: <em>Numerical Simulations of Two-fluid Flow Problems by an Energy-stable Lagrange-Galerkin Scheme</em></td>
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<tr>
<td>11:00-11:30</td>
<td>Speaker: Maxim Yakubovich</td>
<td>Title: <em>Methods of Trajectories and Finite Elements in a Problem of the Supersonic Flow in the Asymmetrical Channel</em></td>
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<tr>
<td>11:30-12:00</td>
<td>Speaker: Valery Shematovich</td>
<td>Title: <em>Monte Carlo Approach for Studies of the Flows near Natural and Technogenic Objects in the Earth’s Upper Atmosphere</em> - cancelled</td>
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12:00-14:00 LUNCH
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<td>(Flamingo Grand Hall) Chair: Bojan Popov</td>
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<td>14:00-14:30</td>
<td>Speaker: Nicoleta-Corina Babalic</td>
<td>Title: <em>Bilinear Supersymmetric Gardner Equation and Its Soliton Solutions</em></td>
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<tr>
<td>14:30-15:00</td>
<td>Speaker: Victor Lyashenko/Elena Kobilska</td>
<td>Title: <em>Contact Boundary Value Problems and Nonlocal Problems in Mathematical Models of Heat Transfer</em></td>
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<tr>
<td>15:00-15:30</td>
<td>Speaker: Daniela Georgieva</td>
<td>Title: <em>Merging and Energy Exchange between Optical Filaments</em></td>
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<td></td>
<td>Parallel Session OTHERS</td>
<td>(Flamingo Grand Jaco Hall) Chair: Michail Todorov</td>
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<tr>
<td>14:00-14:30</td>
<td>Speaker: Krassimira Vlachkova/Ognian Kassabov</td>
<td>Title: <em>Bi-quartic Parametric Polynomial Minimal Surfaces</em></td>
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<tr>
<td>14:30-15:00</td>
<td>Speaker: Ivan Ourdev</td>
<td>Title: <em>A Tale of Two Tails: Investing with the Return Distribution</em></td>
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<tr>
<td>15:00-15:30</td>
<td>Speaker: Tsvetanka Kovacheva</td>
<td>Title: <em>Decision Making in Prioritization of Required Operational Capabilities - cancelled</em></td>
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<tr>
<td>15:30-16:00</td>
<td>COFEE BREAK</td>
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(Flamingo Grand Hall)
Chair: Nikolay Kutev

16:00-16:30 Speaker: Todor Stoyanov
Title: Some New Estimates of the Modulus of Some Integrals of the Unit Circle in the Complex Plane

16:30-17:00 Speaker: Emilia Bazhlekova
Title: On the Rayleigh-Stokes Problem for Generalized Oldroyd-B Fluids

17:00-17:30 Speaker: Daniela Vasileva
Title: Finite-difference Approximation for Two-dimensional Generalized Oldroyd-B Fluids

17:30-18:00 Speaker: Petras Rupsys
Title: The Use of Copulas to Practical Estimation of Multivariate Stochastic Differential Mixed-Effects Models
FRIDAY JULY 3, 2015

08:30-09:30  PLENARY LECTURE: Nikolay Kolev
Title: SKYTHIA: A Universal Multi-phase Analyzer
(Flamingo Grand Hall)
Chair: Michail Todorov

09:30-10:00  COFFEE BREAK

10:00-12:00  Session SCIENTIFIC COMPUTING
(Flamingo Grand Hall)
Chair: Nikolay Kolev

10:00-10:30  Speaker: Valentin Gushchin
Title: Classification of the Stratified Fluid Flows Regimes around a Square Cylinder

10:30-11:00  Speaker: Elena Zemlyanaya
Title: Numerical Simulation of Photoexcited Polaron States in Water

11:00-11:30  Speaker: Anna Efimova
Title: Numerical Simulation of Plasma Turbulence During the Injection of the Electron Beam

11:30-12:00  Speaker: Jordan Genoff
Title: Extremely High-Precision Computations in Large-Scale Classical and Quantum Molecular Mechanics Simulation - cancelled

12:00  RECAPITULATION AND CLOSING OF THE CONFERENCE

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