
PROGRAM
for
THIRD INTERNATIONAL CONFERENCE
APPLICATION OF MATHEMATICS IN TECHNICAL AND NATURAL
SCIENCES
ALBENA
JUNE 20-25, 2011

SUNDAY, JUNE 19, 2011

17:00-19:00 REGISTRATION
Hotel Ralitca Superior – reception desk

MONDAY, JUNE 20, 2011

07:30-08:30 REGISTRATION
Hotel Ralitca Superior – reception desk

08:30-09:00 OPENING (Ralitca Superior Hall)

09:00-10:00 Room A (Ralitca Superior Hall)
Chair: Michail Todorov
PLENARY LECTURE: Azmy Ackleh
Title: *Explicit High Resolution Finite Difference Schemes for a Juvenile-Adult Amphibian Model*

10:00-10:15 COFEE BREAK

10:15-12:15 Special Session MODELING IN BIOLOGY, ECOLOGY
AND EPIDEMIOLOGY
Room A (Ralitca Superior Hall)
Chairs: Azmy Ackleh

10:15-19:45 Speaker: Ben Fitzpatrick
Title: *Parameter Estimation for Gene Regulatory Network Modeling*

10:45-11:15 Speaker: Peter Hinow

- 11:15-11:45 Title: *Modeling the Effects of Drug Binding on the Dynamic Instability of Microtubules*
Speaker: Tanya Kostova-Vassilevska
- 11:45-12:15 Title: *A Model of Within-cell Virus Replication*
Speaker: Svetoslav Markov
Title: *On the Mathematical Modeling of Microbial Growth*
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10:15-12:15 Parallel Session MATHEMATICAL MODELING
Room B (Vita Park Hall)
Chair: Nikolay Kutev

- 10:15-10:45 Speaker: Jordan Genoff (cancelled)
Title: *High Fidelity Finite Length Markov Chain Walks*
- 10:45-11:15 Speaker: Detelina Kirova
Title: *Comparison of Three Methods to Estimate Wind Speed Distribution*

11:15-11:45 Speaker: Yonko Stoyanov
Title: *Fracture Analysis in Functionally Graded Magnetoelastic Plane by the Boundary Integral Equation Method*

11:15-11:45 Speaker: Gennady Markelov
Title: *Statistical Simulation of Gas Flows through Short Rough Microchannels*

12:15-14:00 **LUNCH**

14:00-15:00 Parallel Session MATHEMATICAL MODELING
Room A (Ralitca Superior Hall)
Chairs: Francois Feuillebois

- 14:00-14:30 Speaker: Olga Zeynalova
Title: *Digital Pulse Processing of Nuclear Detectors*
- 14:30-15:00 Speaker: Dian Calkins (cancelled)
Title: *The Matrix: Mathematic Modeling for the Liberal Arts: Graphic Literacy*

15:00-15:30 Parallel Session BIOMATHEMATICS
Room A (Ralitca Superior Hall)
Chairs:

15:00-15:30 Speaker: Narcisa Apreutesei (cancelled)
Title: *Some Properties of Integro-differential Equations from Biology*

14:00-15:30 Parallel Session NUMERICAL METHODS, Room B (Vita Park Hall)
Chair: Nikolay Kutev

14:00-14:30 Speaker: Gaik Ambartsoumian
Title: *Image Reconstruction in Acoustic Reflectivity Tomography*

14:30-15:00 Speaker: Ivan G. Ivanov
Title: *Numerical Solvers for Maximal Solution to a Set of Discrete-time Algebraic Riccati Equations*

15:00-15:30 Speaker: Lubin Vulkov
Title: *On the Conservation Law Forms of the Two- and Three Dimensional Equations of the Nonlinear Elasticity*

15:30-15:45 COFEE BREAK

15:45-17:45 Parallel Session BIOMATHEMATICS, Room A (Ralitca Superior Hall)
Chair: Roumen Angelov

15:45-16:15 Speaker: Piret Avila
Title: *An Analytical Study of the Stochastic Super-Exponential Growth Model for Human Population Dynamics*

16:15-16:45 Speaker: Nino Khatiashvili
Title: *On the Mathematical Model of Cancer Growth in Connection to the New Capillary Network Formation at the Human Brain*

16:45-17:15 Speaker: Neli Dimitrova
Title: *Asymptotic Stabilization of a Chemostat Model of Plasmid-bearing, Plasmid-free Competition*

17:15-17:45 Speaker: Milen Borisov
Title: *Bifurcation Analysis in a Model of 1,2-dichloroethane*

*Biodegradation by Klebsiella Oxytoca va 8391 Immobilized
on Granulated Activated Carbon Using the Maple Packages
BifTools and IntervalTools*

- 15:45-17:15 Parallel Session NUMERICAL METHODS, Room B (Vita
Park Hall)
Chair: Natalia Kolkovska
- 15:45-16:15 Speaker: Abdelkader Saidi
Title: *Theoretical Analysis and Numerical Approximation for
the Control of Pollutant Transport in Shallow Water*
- 16:15-16:45 Speaker: Ali Davari (cancelled)
Title: *Numerical Solution of nonlinear Volterra Integral
Equations of the Second Kind by Using Haar Wavelets*
- 16:45-17:30 Poster Session, Room B (Vita Park Hall)

20:00 WELCOME PARTY
Restaurant Bailando, hotel Flamingo Grand

THUESDAY, JUNE 21, 2011

08:30-09:30 Room A (Ralitca Superior Hall)
Chair: Michail Todorov

PLENARY LECTURE: Wil Schilders
Title: *Model Order Reduction for Industrial Problems*

09:30-09:45 COFEE BREAK

09:45-11:45 Special Session MODELING IN BIOLOGY, ECOLOGY
AND EPIDEMIOLOGY, Room A (Ralitca Superior Hall)
Chair: Tanya Kostova

09:45-10:15 Speaker: Hristo Kojouharov
Title: *Mathematical Modeling of Phagocyte Antibacterial
Activity on Medical Implant Surfaces*

10:15-10:45 Speaker: Paul Salceanu
Title: *Uniform Persistence in Discrete and Continuous
Non-autonomous Dynamical Systems with Application to
Epidemic Models*

10:45-11:15 Speaker: Maya Martcheva
Title: *Seasonality in Avian Influenza H5N1*

11:15-11:45 Speaker: Roumen Anguelov
Title: *Mathematical Modeling of Sterile Insect Technology for
Control of Anopheles Mosquito*

11:45-12:15 Parallel Session APPLIED ANALYSIS, Room A
(Ralitca Superior Hall)
Chair: Tanya Kostova

11:45-12:15 Speaker: Tatyana Stancheva
Title: *Approximation of Nonhomogeneous System ODEs with
Constant Coefficients by Homogeneous First Order System
ODEs with Constant Coefficients*

09:45-12:15 Parallel Session NUMERICAL METHODS

Room B (Vita Park Hall)
Chair: Svetozar Margenov

- 09:45-10:30 KEYNOTE SPEAKER: Ivan Hristov
Title: *Numerical Investigation of Fluxon Interactions in Josephson Stacks*
- 10:30-11:00 Speaker: Clemens Hofreither
Title: *A Non-standard Finite Element Method based on Boundary Integral Operators*
- 11:00-11:30 Speaker: Juri Kandilarov
Title: *Immersed FEM for Elliptic Interface Problems with Non-homogeneous Jump Condition of Special Type*
- 11:30-12:15 Special Session BOUSSINESQ PARADIGM AND SOLITARY WAVES, Room B (Vita Park Hall)
Chair: Nikolay Kutev
- 11:45-12:15 KEYNOTE LECTURE: Ivailo Mladenov
Title: *Traveling Wave Solutions of the Gardner Equation*

12:15-14:00 **LUNCH**

- 14:00-15:30 Parallel Session APPLIED ANALYSIS
Room A (Ralitca Superior Hall)
Chair: Predrag Rajkovic
- 14:00-14:45 KEYNOTE LECTURE: Luis Castro
Title: *The Helmholtz Equation in 270 Degrees Wedge Sectors Facing Dirichlet, Neumann and Impedance Boundary Condition*
- 14:45-15:15 Speaker: Anabela Silva
Title: *On the Invertibility of Classes of Integral Operators via Generalized Factorization*

14:00-15:15 Special Session BOUSSINESQ PARADIGM AND SOLITARY WAVES, Room B (Vita Park Hall)
Chair: Michail Todorov

14:00-14:45 KEYNOTE SPEAKER: Vladimir Gerdjikov
Title: *On Soliton Equations and Soliton Interactions*
14:45-15:15 Speaker: Nikolay Kutev
Title: *On the Use of Numerical Data for Evaluating the
Parameters of the a-priori Estimates for the Onset of Blow
Up in Boussinesq Paradigm Equation*

15:15-15:30 COFEE BREAK

15:30-18:15 Parallel Session APPLIED ANALYSIS
Room A (Ralitca Superior Hall)
Chair: Luis Castro

15:30-16:00 Speaker: Predrag Rajkovic
Title: *The Deformed Exponential Functions of Two Variables –
Motivation and Applications*

16:00-16:30 Speaker: Boris Ananiev
Title: *Some Problems of Observations' Control*

16:30-17:00 Speaker: Mihail Busu
Title: *Hierarchical Classification and Functional Data
Analysis Techniques*

16:30-17:00 Speaker: Tanya Melton
Title: *Third Order Convergence for Nonlinear Impulsive
Differential Equations with a Nonlinear Three-point
Boundary Condition*

17:00-18:00 Speaker: Vanyo Donev
Title: *On the Existence of Nonoscillatory and Oscillatory
Solutions of Second Order Neutral Delay Impulsive
Differential Equations with Constant Coefficients*

15:30-17:30 Special Session BOUSSINESQ PARADIGM AND
SOLITARY WAVES, Room B (Vita Park Hall)
Chair: Nectarios Papanicolaou

15:30-16:00 Speaker: Natalia Kolkovska
Title: *A New Conservative Finite Difference Scheme for
Boussinesq Paradigm Equation*

16:00-16:30 Speaker: Daniela Vasileva

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- 16:30-17:00 Title: *On the Numerical Investigation of Unsteady Solutions for the 2D Boussinesq Paradigm Equation in Moving Frame Coordinate System*
Speaker: William J. Sonnier
- 17:00-17:30 Title: *Parameterizing the Shapes of Repelling Quasi-particles Of the Vector Nonlinear Schroedinger Equations*
Speaker: Michail Todorov
- 17:30-18:00 Title: *Perturbation Solution for the 2D Shallow-water Waves*
- 17:30-18:00 Poster Session, Room B (Vita Park Hall)
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WEDNESDAY, JUNE 22, 2011

- 08:30-09:30 Room A (Ralitca Superior Hall)
Chair: Michail Todorov
PLENARY LECTURE: Joe Goddard
Title: *Moments and Micromorphic Continua*
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- 09:30-09:45 COFFEE BREAK
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- 09:45-12:30 Special Session MODELING IN CONTINUUM MECHANICS
AND FIELD THEORY, Room A (Ralitca Superior Hall)
Chair: Michail Todorov
- 09:45-10:15 Speaker: Nectarios Papanicolaou
Title: *A Beam-Fourier Technique for the Numerical
Investigation of 2D Nonlinear Thermoconvective Flows*
- 10:15-10:45 Speaker: Kiril Shterev
Title: *Influence of Reservoirs on Pressure Driven Gas Flow in
a Micro-channel*
- 10:45-11:15 Speaker: Andreas Savva
Title: *Generating Non-structured Surfaces Defining by n-
Degree Polynomials*
- 11:15-11:45 Speaker: Dobri Dankov
Title: *Stationary Cylindrical Couette Flow at Different
Temperature of Cylinders. Local Knudsen Number Effect*
- 11:45-12:30 KEYNOTE SPEAKER: Anastasis Polycarpou (Telebridge)
Title: *Spectral Formulation for the Solution of Full-wave
Scattering from a Conducting Wedge Tipped with a
Corrugated Cylinder*
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- 09:45-12:00 Minisymposium STABILITY, VIBRATIONS AND
CONTROL OF SYSTEMS, Room B (Vita Park Hall)
Chair: Ardeshir Guran
- 09:45-10:30 KEYNOTE SPEAKER: Ardeshir Guran
Title: *The Static and Dynamic Stability of Carbon Nanotubes*
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10:30-11:00 Speaker: Claudia Timofte
Title: *On the Asymptotic Behavior of a Reaction-Diffusion System in a Porous Medium Micro-channel*

11:00-11:30 Speaker: Katrin Laas
Title: *Resonant Behavior of a Fractional Oscillator with Random Damping Micro-channel*

11:30-12:00 Speaker: Ako Sauga
Title: *Energy Transfer in Ratchets Driven by Additive Trichotomous Noise*

12:00-12:30 Special Session MODELING IN BIOLOGY, ECOLOGY AND EPIDEMIOLOGY, Room B (Vita Park Hall)
Chair:

12:00-12:30 Speaker: Mihaela Ciupe (cancelled)
Title: *Models of Antibody Responses to Viral Infections*

12:30-14:00 **LUNCH**

14:30-19:30 **EXCURSION AND SOCIAL ACTIVITIES**
(The cape of Kaliakra and the botanic garden and the palace in the town of Balchik)

20:00 **BANQUET in restaurant of Old Oak**

THURSDAY, JUNE 23, 2011

08:30-09:30 Room A (Ralitca Superior Hall)
Chair: Michail Todorov

PLENARY LECTURE: Vladislav Pukhnachev
Title: *Group-theoretical Methods in Convection Problems*

09:30-09:45 COFEE BREAK

09:45-11:00 Parallel Session SCIENTIFIC COMPUTING
Room A (Ralitca Superior Hall)
Chair: Stefka Dimova

09:45-10:30 KEYNOTE SPEAKER: Svetozar Margenov
Title: *On Semi-coarsening Multilevel Preconditioning of Higher Order FEM Systems*

10:30-11:00 Speaker: Nikola Kosturski
Title: *Comparison of Two Techniques for Radio-Frequency Hepatic Tumor Ablation through Numerical Simulation*

11:00-12:30 Parallel Session NUMERICAL METHODS,
Room A (Ralitca Superior Hall)
Chair:

11:00-11:30 Speaker: Mikhail Kolev (cancelled)
Title: *Reliable FEM Approximations for a Model of Cell-matrix Interactions and Cell Migration*

11:30-12:00 Speaker: Ivan Georgiev
Title: *Two Level Method for Discontinuous Galerkin Discretizations of Elliptic Problems with Highly Varying Coefficients*

12:00-12:30 Speaker: Ivan Bazhlevkov
Title: *Numerical Method for 3D Simulation of Foam Dynamics in the Presence of Surfactant*

09:45-12:30 Parallel Session MATHEMATICAL PHYSICS
Room B (Vita Park Hall)

Chair: Vladimir Gerdjikov

- 09:45-10:30 KEYNOTE SPEAKER: Anna Antonova
Title: *Time Delay Models of Business Cycle*
- 10:30-11:15 KEYNOTE SPEAKER: Francois Feuillebois
Title: *Motion of Particles in a Parabolic Flow near a Slip Wall*
- 11:15-12:00 KEYNOTE SPEAKER: Ivan Koprinkov
Title: *Theory of Quantum Transitions Based on Nonadiabatic Dressed States*
- 12:00-12:30 Speaker: Dimo Dimov
Title: *Precise Approximation of (ρ, θ) -Hough Transform over a Rectangular Grid*

12:30-14:00 **LUNCH**

- 14:00-15:00 Minisymposium STABILITY, VIBRATIONS AND CONTROL OF SYSTEMS, Room A (Ralitca Superior Hall)
Chair: Ardeshir Guran
- 14:00-14:30 Speaker: Nikolai Magnitskii (cancelled)
Title: *The Universal Theory of Chaotic Dynamics with Applications in Nonlinear Differential Equations and Turbulence in Fluids*
- 14:30-15:00 Speaker: Kamran Iqbal (cancelled)
Title: *Postural Stability Analysis and PID Controller Synthesis for Movement Coordination in a Multi-segment Biomechanical Model*
- 15:00-15:30 Speaker: Goodarz Ahmadi
Title: *Computational Approaches to the Lorenz System*

14:00-15:45 Parallel Session MATHEMATICAL PHYSICS
Room B (Vita Park Hall)
Chair: Vladislav Pukhnachov

- 14:00-14:30 Speaker: Vanyo Donev
Title: *On the Existence of Nonoscillatory and Oscillatory Solutions of Second Order Neutral Delay Impulsive*
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| 14:30-15:00 | <i>Differential Equations with Constant Coefficients</i> Speaker: Clementina Mladenova |
| 15:00-15:30 | Title: <i>Rotations and Some Mechanical Applications</i> Speaker: Nikolai Magnitskii Title: <i>The New Approach to Analysis of Chaotic Dynamics in Hamiltonian and Conservative Systems</i> |
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| 15:30-15:45 | COFEE BREAK |
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| 15:30-17:30 | Special Session BOUSSINESQ PARADIGM AND SOLITARY WAVES, Room A (Ralitca Superior Hall) Moderators: Nectarios papanicolaou and Michail Todorov |
| 15:45-16:15 | Speaker: Marios Christou (Telebridge) Title: <i>Soliton Interactions on a Boussinesq type Equation with a Linear Restoring Force</i> |
| 16:15-16:30 | Preparation |
| 16:30-17:15 | KEYNOTE SPEAKER: Christo Christov (Telebridge) Title: <i>On the Pseudolocalized Solutions in Multi-dimension as Candidates for Quasi-Particles</i> |
| 17:15-18:00 | KEYNOTE SPEAKER: Pedro Jordan (Telebridge) Title: <i>Nonlinear Acoustic Propagation in Thermoviscous, Thermally Relaxing Fluids: Shock Formation and Viscosity Mitigation</i> |
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| 15:45-17:30 | Parallel Session MATHEMATICAL PHYSICS Room B (Vita Park Hall) Chair: Anna Antonova |
| 15:45-16:30 | KEYNOTE SPEAKER: Dan Censor Title: <i>The Quasi Lorentz Transformation for Rotating Objects</i> |
| 16:30-17:15 | KEYNOTE SPEAKER: Vladimir Gerdjikov Title: <i>On Soliton Equations and Soliton Interactions</i> |

FRIDAY, JUNE 24, 2011

- 08:30-10:30 Special Session MODELING IN BIOLOGY, ECOLOGY
AND EPIDEMIOLOGY
Room A (Ralitca Superior Hall)
Chairs: Paul Salceanu
- 08:30-9:00 Speaker: Jean Lubuma
Title: *Stability Analysis and Dynamically Consistent Numerical
Schemes for the SIS Model and Related Reaction Diffusion
and Volterra Integral Equations*
- 9:00-9:30 Speaker: Yves Dumont
Title: *Spatio-temporal Modeling of Mosquito Dispersal.
Applications in Vector Control*
- 9:30-10:00 Speaker: Oscar Angulo
Title: *An Approach to the Numerical Integration of
Age-structured Population Models with Finite Life Span*
- 10:00-10:30 Speaker: Jeremy Thibodeaux
Title: *Optimal Treatment Strategies for Malaria Infection*
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- 10:15-11:45 Special Session HPC GRID APPLICATIONS
Room B (Vita Park Hall)
Chairs: Todor Gurov
- 08:30-9:00 Speaker: Ivan Lirkov
Title: *Highly Parallel Alternating Directions Algorithm for
Time Dependent Problems*
- 9:00-9:30 Speaker: Georgi Gadzhev
Title: *Atmospheric Composition of the Balkan Region and
Bulgaria – Some Numerical Experiments*
- 9:30-10:00 Speaker: Radoslava Goranova
Title: *Framework for Service Composition in g-Lite*
- 10:00-10:30 Speaker: Tzvetan Ostromsky
Title: *Sensitivity Study of the Ozone Concentrations Output
From the Unified Danish Eulerian Model in Parallel and Grid
Environment*
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- 10:30-10:45 COFEE BREAK
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Room A (Ralitca Superior Hall)

10:15-11:30 KEYNOTE SPEAKER: Daishi Watabe (Telebridge)
Title: *A Third-order Scheme to Guarantee Non-negative Coefficients for Advection-diffusion Equations*
Moderator: Nectarios Papanicolaou

11:30-11:45 Poster Session

11:45-12:30 Multimedia Presentation
Speaker: Dan Censor
Title: *Albert's Cow and Special Relativity: A Layman's Introduction (Almost) without Mathematics*

10:45-12:30 Special Session HPC GRID APPLICATIONS
Room B (Vita Park Hall)
Chairs: Emanouil Atanasov

10:45-11:30 KEYNOTE SPEAKER: Aneta Karaivanova
Title: *Monte Carlo Simulation of Electron Transport using a Class of Sequences Generating Permutations*

11:30-12:00 Speaker: Todor Gurov
Title: *How to Use HPC Resources Efficiently by a Message Oriented Framework*

12:00-12:30 Speaker: Nikolay Manev
Title: *Steganography, Error Control Codes and the Relation with HPC*

12:30-14:00 **LUNCH**

14:00 **CLOSING THE CONFERENCE** – Ralitca Superior Hall

POSTER PRESENTATION

Miglena Koleva

Title: *Iterative Methods for Solving Nonlinear Parabolic Problem in Pension Saving Management*
