

MASTER PROGRAM
for
FIFTH INTERNATIONAL CONFERENCE
APPLICATION OF MATHEMATICS IN TECHNICAL AND NATURAL
SCIENCES
ALBENA, JUNE 24-29, 2013

SUNDAY, JUNE 23, 2013

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

MONDAY, JUNE 24, 2013

07:30-08:30 REGISTRATION

08:30-09:00 Flamingo Grand Hotel – 3rd floor
OPENING (Flamingo Grand Hall)

09:00-10:00 PLENARY LECTURE: Boris Alexeev
(Flamingo Grand Hall)
Chair: Michail Todorov

Title: *Non-local Physics: Applications from the Universe
Evolution to the Atom Structure in the Frame of the
Unified Theory*

10:00-10:15 COFEE BREAK

10:15-12:15 Parallel Session APPLIED PHYSICS
Flamingo Grand Hall
Chair: Boris Alexeev

10:15-10:45 Speaker: Astrid Rekker
Title: *Resonant Behavior of the Spatial Cross-Correlation for
Particles Embedded in Viscoelastic Shear Flow*

10:45-11:15 Speaker: Atanas Ivanov
Title: *Short-Time Air Pollution Forecasts Using Predictive
Modeling Techniques*

11:15-11:45 Speaker: Snezhana Gocheva-Ilieva
Title: *MARS Models of Laser Efficiency of Copper Bromide
Laser*

11:45-12:15 Speaker: Alexandre Fedoseyev – extraordinary talk
Title: *Multiscale Simulation of Nanostructured Quantum Dot Based Solar Cells*

10:15-12:15 Parallel Session SCIENTIFIC COMPUTING CHEMISTRY
(Flamingo Grand Jaco Hall)

Chair: Nikolai Manev

10:15-10:45 Speaker: Borislav Stoyanov
Title: *Stream Cipher Encryption Based on Bent Boolean Function and Chebyshev Polynomials*

10:45-11:15 Speaker: Krasimir Kordov
Title: *Cryptanalysis of a Modified Encryption Scheme Based On Bent Boolean Function and Feedback with Carry Shift Register*

11:15-11:45 Speaker: Ivan Lirkov
Title: *Comparative Analysis of High Performance Solvers for Solving Stokes Equation*

11:45-12:15 Speaker: Dobri Dankov – poster
Title: *Viscous Drag and Heat Transfer in Non-Stationary Gas Flow between Rotating Cylinders*

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

14:00-15:45 Special Session “Advances in Numerical Methods for Computational Science” dedicated to Professor Raytcho Lazarov on the occasion of his 70th birthday (Flamingo Grand Hall)

Chair: Michail Todorov

14:00-14:45 KEYNOTE SPEAKER: Raytcho Lazarov
Title: *Galerkin FEM for Inhomogeneous Time-Dependent Fractional Diffusion Equations*

14:45-15:15 Speaker: Stefka Dimova
Title: *New Class of Metastable Blow-Up Solutions of the Mathematical Model of Heat Structures*

15:15-15:45 Speaker: Natalia Kolkovska
Title: *A Four-Level Conservative Finite Difference Scheme for Boussinesq Paradigm Equation*

14:00-15:45 Special Session NUMERICAL METHODS FOR ADVANCED COMPUTING (Flamingo Grand Jaco Hall)

Chair: Svetozar Margenov

14:00-14:45 KEYNOTE SPEAKER: Maya Neytcheva
Title: *Numerical Solution Techniques for Multiphase Flow Problems*

14:45-15:15 Speaker: Kostadin Ganev
Title: *Some Numerical Studies of the Atmospheric Composition Climate of Bulgaria*

15:15-15:45 Speaker: Iliycho Iliev
Title: *Nonlinear Second-Degree Model of Laser Efficiency of CuBrLaser*

15:45-16:00 COFEE BREAK

16:00-17:30 Special Session “Advances in Numerical Methods for Computational Science” dedicated to Professor Raytcho Lazarov on the occasion of his 70th birthday (Flamingo Grand Hall)

Chair: Michail Todorov

16:00-16:30 Speaker: Ivan Hristov
Title: *Numerical Investigation of the Unified Model of Stacked Josephson Junctions*

16:30-17:00 Speaker: Alexandre Fedoseyev
Title: *Modeling for High Reynolds Number Flows with Generalized Hydrodynamics Equations (GHE)*

17:00-17:30 Speaker: Gregory Secrieru – cancelled
Title: *Mathematical Modeling of Impulsive Loading of Explosive Charge*

16:00-17:30 Special Session NUMERICAL METHODS FOR ADVANCED COMPUTING (Flamingo Grand Jaco Hall)

Chair: Svetozar Margenov

16:00-16:30 Speaker: Svetozar Margenov
Title: *A New Multiscale Multilevel Algorithm Applied to Bone Tissue Modeling*

16:30-17:00 Speaker: Dimiter Syrakov
Title: *Downscaling of Bulgarian Chemical Weather Forecast From Bulgaria Region to Sofia City*

17:00-17:45

Speakers: Marcin Paprzycki and Maria Ganzha

Title: *Developing Semantic Representation of Computational
Linear Algebra*

20:00

WELCOME PARTY – Piano bar of Bailando

THUESDAY, JUNE 25, 2013

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

PLENARY LECTURE: Eduard Kansa

Title: *Efficient Meshless Solutions to Multi-Dimensional
Integral and Partial Differential Equations*

09:30-09:45 COFEE BREAK

09:45-11:45 Symposium STABILITY, VIBRATION, AND CONTROL OF
SYSTEMS

Flamingo Grand Hall
Chair: Natasa Trisovic

09:45-10:15 Speaker: Alexander Seyranian

Title: *V.I. Arnold and Stability Problems in Solid Mechanics*

10:15-10:45 Speaker: Anton Belyakov

Title: *Motion of a Pendulum with Periodically Variable Length*

10:45-11:15 Speaker: Gabriel Dimitriu

Title: *An Optimal Control Problem of a Spatial Holling Type
IV Nutrient-Phytoplankton-Zooplankton-Fish System*

11:15-11:45 Speaker: A. Pazouki

Title: *A High Performance Computing Approach for the
Simulation of Large-Scale Fluid-Solid Interaction Problems*

11:45-12:15 Speaker: Kateryna Nesvit - cancelled

Title: *Discrete Mathematical Model of Wave Diffraction on
Pre-fractal Impedance Strips. TM Mode Case*

09:45-12:15 Special Session HIGH-PERFORMANCE MONTE CARLO
AND QUASI-MONTE CARLO SIMULATIONS

Flamingo Grand Jaco Hall
Chair: Emanouil Atanassov

09:45-10:30 KEYNOTE SPEAKER: Aneta Karaivanova

Title: *Randomized Quasi-Monte Carlo Algorithms
Approximating Eigenvalues*

10:30-11:00 Speaker: Petru Bogatencov

Title: *Creation of Parallel Algorithms for the Solution of
Problems of Gas Dynamics on Multi-Core Computers
and GPU*

11:00-11:30 Speaker: Radoslava Hristova

11:30-12:00	<p>Title: <i>User-Level Framework for Performance Monitoring of HPC Applications</i> Speaker: Tzvetan Ostromsky</p> <p>Title: <i>Sensitivity Study of a Large-Scale Air Pollution Model by Using High-Performance Computations and Monte Carlo Algorithms</i></p>
12:30-14:00	LUNCH
14:00-15:00	<p>Flamingo Grand Hall Chair: Nectarios Papanicolaou</p> <p>PLENARY LECTURE: George Jaiani – telebridge Title: <i>Some Hierarchical Models for Cusped Elastic Prismatic Shells</i></p>
15:00-15:45	<p>Symposium STABILITY, VIBRATION, AND CONTROL OF SYSTEMS Flamingo Grand Hall Chair: Alexander Seyranian</p>
15:00-15:45	<p>KEYNOTE LECTURE: Joachim Gwinner Title: <i>Variational Modeling in Nonsmooth Mechanics and Stability Results</i></p>
15:00-15:45	<p>Special Session HIGH-PERFORMANCE MONTE CARLO AND QUASI-MONTE CARLO SIMULATIONS Flamingo Grand Jaco Hall Chair: Aneta Karaivanova</p>
15:00-15:45	<p>Speaker: Todor Gurov Title: <i>Density Modeling Using Monte Carlo: Application in Risk Management</i></p>
15:45-16:00	COFEE BREAK
16:00-17:30	<p>Symposium STABILITY, VIBRATION, AND CONTROL OF SYSTEMS Flamingo Grand Hall Chair: Alexander Seyranian</p>
16:00-16:30	<p>Speaker: Emil Manoach –cancelled Title: <i>Large Amplitude Vibrations of Timoshenko Beams with Delamination</i></p>

- 16:30-17:00 Speaker: Inga Arkhipova
Title: *Stabilization via Parametric Excitation of Statically Unstable Systems*
- 17:00-17:30 Speaker: Ardeshir Guran
Title: *Structure, Mechanics, and Remodeling Process of Bone: Biomechanics of Osteoporosis*
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- 16:00-17:30 Special Session HIGH-PERFORMANCE MONTE CARL AND QUASI-MONTE CARLO SIMULATIONS
Flamingo Grand Jaco Hall
Chair: Todor Gurov
- 16:00-16:30 Speaker: Nikolai Manev
Title: *Erasure Codes in Watermarking and Steganography*
- 16:30-17:00 Speaker: Emanouil Atanassov
Title: *Efficient Estimation of Heston Model Parameters*

WEDNESDAY, JUNE 26, 2013

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

PLENARY LECTURE: Vladislav Pukhnachev – telebridge
Title: *Singular Solutions to the Navier-Stokes Equations*

09:30-09:45 COFEE BREAK

09:45-11:45 Parallel Session MATHEMATICAL PHYSICS & SOLITONS
Flamingo Grand Hall
Chair: Nectarios Papanicolaou

09:45-10:15 Speaker: Oxana Frolovskaya – telebridge
Title: *Special Case of the Cahn-Hilliard Equation*

10:15-10:45 Speaker: Juan Olives
Title: *Green's Formula and Singularity at a Triple Contact Line. Example of Finite-Displacement Solution*

10:45-11:15 Speaker: Yonko Stoynov
Title: *Inverse Scattering Problems for Cracked Piezoelectric Media*

11:15-11:45 Speaker: Rossen Ivanov – telebridge
Title: *Euler-Poincare Equations for G-Strands*

10:15-11:15 Contributed Session APPLIED ANALYSIS
Flamingo Grand Jaco Hall
Chair: Nikolai Kutev

10:15-10:45 Speaker: Vladas Skakauskas
Title: *Solvability of a Receptor-Toxin-Antibody Interaction Model*

10:45-11:15 Speaker: Luis Castro
Title: *On Wave Diffraction Boundary Value Problems with a Crack Perpendicular to the Main Boundary*

12:00-14:00 LUNCH

14:00-19:00 **EXCURSION AND SOCIAL ACTIVITIES**
(The Wonder Rocks near the village of Asparukhovo and the

ethnographic complex of Ovchaga)

19:30-23:30

BANQUET DINNER
(restaurant of Bulgarian Fiesta)

THURSDAY, JUNE 27, 2013

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

PLENARY LECTURE: Boris Alexeev
Title: *Solution of the Dark Matter and Dark Energy Problems by Methods of Non-Local Physics*

09:30-09:45 COFEE BREAK

09:45-12:15 Parallel Session BIOMATHEMATICS
Flamingo Grand Hall
Chair: Alexandre Fedoseyev

09:45-10:15 Speaker: Narcisa Apreutesei
Title: *Some Properties of Integro-Differential Equations from Biology*

10:15-10:45 Speaker: Neemi Lumi
Title: *Noise-Induced Transitions in a Generalized Verhulst Model with a Reflecting Boundary*

10:45-11:15 Speaker: Anna Antonova
Title: *On Periodic Solutions of Goodwin's Business Cycle Model with only Floor in Induced Investment*

11:15-12:15 Parallel Session MATHEMATICAL PHYSICS AND SOLITONS

11:15-11:45 Speaker: Ivailo Mladenov
Title: *Traveling Wave Solutions of the Boussinesq Paradigm Equation*

11:45-12:15 Speaker: Nectarios Papanicolaou
Title: *Numerical Characterization of Nematic Liquid Crystal Microstructures under Applied DC Electric Fields*

09:45-10:45 Special Session "Advances in Numerical Methods for Computational Science" dedicated to Professor Raytcho Lazarov on the occasion of his 70th birthday (Flamingo Grand Jaco Hall)
Chair: Stefka Dimova

09:45-10:15 Speaker: Joachim Gwinner
Title: *Finite Element Approximation of Higher Order for Nonsmooth Problems and Time Discretization by Implicit Runge-Kutta Methods*

10:15-10:45 Speaker: Michail Todorov
Title: *N-Soliton Interactions for the Perturbed Manakov System*

10:45-12:15	Parallel Session APPLIED ANALYSIS Flamingo Grand Jaco Hall
10:45-11:15	Speaker: Maria Rodrigues Title: <i>Weierstrass Transform Associated with the Whittaker Transform Integral</i>
11:15-11:45	Speaker: Mikhail Cherdantsev –cancelled Title: <i>Homogenisation of Periodic Elastic Plates in Bending Regime</i>
11:45-12:15	Speaker: Alberto Simoes Title: <i>The Impedance Problem of Wave Diffraction by a Strip With Higher Order Boundary Conditions</i>
12:15-14:00	LUNCH
14:00-16:30	Parallel Session MATHEMATICAL PHYSICS AND SOLITONS Flamingo Grand Hall Chair: Maya Neytcheva
14:00-14:45	KEYNOTE SPEAKER: Nikolai Magnitskii Title: <i>Traveling Waves, Impulses and Diffusion Chaos in Autooscillating Media</i>
14:45-15:15	Speaker: Nikolai Kutev Title: <i>Global Existence to Generalized Boussinesq Equation with Combined Power-Type Nonlinearities</i>
15:15-15:45	Speaker: Danail Brezov Title: <i>Some New Results About Three Dimensional Rotations and Pseudo-Rotations</i>
14:00-15:30	Symposium STABILITY, VIBRATION, AND CONTROL OF SYSTEMS Flamingo Grand Jaco Hall Chairs: Natasa Trisovic and Ardeshir Guran
14:00-14:30	Speaker: Ardeshir Guran Title: <i>Damage Diagnosis of the Tallest Pure-Brick Tower in the World Using a Robust Digital Image Analysis System</i>
14:30-15:00	Speaker: Natasa Trisovic Title: <i>Uncertainty Quantification and Simulation in Reanalysis Procedures</i>
15:00-15:30	Speaker: TBA Title:
15:45-16:00	COFEE BREAK

- 16:00-17:00 Parallel Session MATHEMATICAL PHYSICS AND SOLITONS
Flamingo Grand Hall
Chair: Michail Todorov
- 16:00-16:30 Speaker: Daniela Georgieva
Title: *Parametric Solitons*
- 16:30-17:30 Workshop PROBLEMS OF NUMERICAL MODELLING OF
NONLINEAR WAVE PROCESSES
Flamingo Grand Hall
Chair: Michail Todorov
- Speaker: Lubomir Kovachev
Title: *Broad-Band Laser Pulses. Linear and Nonlinear Regime*
- Speaker: Ivan Koprinkov
Title: *Propagation Behavior of Ultrashort High-Intensity Light Pulses*
- 16:00-17:00 Parallel Session SCIENTIFIC COMPUTING
Flamingo Grand Jaco Hall
Chair: Raytcho Lazarov
- 16:00-16:30 Speaker: Georgi Georgiev
Title: *Spherical Long Spirals*
- 16:30-17:00 Speaker: Ivan Bazhlekov
Title: *Numerical Simulation of Drop Coalescence in the Presence of Drop Soluble Surfactant*

FRIDAY, JUNE 28, 2013

08:30-09:30	PLENARY LECTURE: Stefan Stefanov Title: <i>Modeling of Gas Flows through Microchannel Configurations</i> Flamingo Grand Hall Chair: Michail Todorov
09:30-09:45	COFEE BREAK
09:45-10:15	Contributed Session APPLIED PHYSICS Flamingo Grand Hall Chair: Michail Todorov
09:45-10:15	Speaker: Kateryna Nesvit Title: <i>Discrete Mathematical Model of Wave Diffraction on Pre-fractal Impedance Strips. TM Mode Case</i>
10:15-11:15	Contributed Session APPLIED ANALYSIS
10:15-10:45	Speaker: Emiliya Bazhlekova Title: <i>On a Nonlocal Boundary Value Problem for the Two-Term Time-Fractional Diffusion-Wave Equation</i>
10:45-11:45	Speaker: Todor Stoyanov Title: <i>Stream Cipher Encryption Based on Bent Boolean Function and Chebyshev Polynomials</i>
11:15-12:15	Contributed Session APPLIED PHYSICS
11:15-11:45	Speaker: Ako Sauga Title: <i>Nonequilibrium Transport Phenomena in a Tilted Ratchet Model Subjected to a Multiplicative Trichotomous Noise</i>
11:45-12:15	Speaker: Renna Djulgerova - poster Title: <i>Collision Dynamics of Some Atomic States in Ne Hollow Cathode Plasma Using Time-Resolved Optogalvanic Signals</i>
12:15	CLOSING THE CONFERENCE – Flamingo Grand Hall
12:30-14:00	LUNCH
