# **MASTER PROGRAM**

for

# ELEVENTH INTERNATIONAL CONFERENCE APPLICATION OF MATHEMATICS IN TECHNICAL AND NATURAL SCIENCES ALBENA, JUNE 20-25, 2019

# **WEDNESDAY, JUNE 19, 2019**

17:00-19:00 REGISTRATION

Flamingo Grand Hotel – 3rd floor

# THURSDAY, JUNE 20, 2019

07:30-08:30 REGISTRATION

Flamingo Grand Hotel – 3rd floor

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

09:00-10:00 PLENARY LECTURE: Vladislav Pukhnachev

Title: Singularities in Viscous Flows

(Flamingo Grand Hall) Chair: Michail Todorov

### 10:00-10:30 COFEE BREAK

Parallel Session SCIENTIFIC COMPUTING

(Flamingo Grand Hall)

Chair: Vladislav Pukhanchev

10:30-11:00 Speaker: Peter Martyshko

Title: On Solutions Forward and Inverse Problem Potential

Geophysical Fields

11:00-11:30 Speaker: Elena Akimova

Title: Conjugate Gradient Method for Solving the Inverse Gravimetry Problem in Multilayered Medium: Parallel

Implementation on GPU

11:30-12:00 Speaker: Elena Lilkova

Title: Computational Study of Novel Natural Bioactive Peptides

in Solution

Parallel Session MATHEMATICAL PHYSICS AND

TRANSPORT PROCESSES (Flamingo Grand Jaco Hall)

Chair: Ivanka Zheleva

10:30-11:00 Speaker: Anna Efimova

Title: Hybrid Models of Ion-Acoustic Collisionless Shock

Speaker: Merike Martsepp
 Title: Multifractal Analysis of Plasma Irradiated Tungsten Alloy Samples
 Speaker: Vladimir Gerdjikov
 Title: Kulish-Sklyanin Type Models: Integrability, Reductions and Soliton Solutions

# 12:00-14:00 LUNCH

14:00-15:00	Parallel Session SCIENTIFIC COMPUTING (Flamingo Grand Hall) Chair: Alex Fedoseyev
14:00-14:30	Speaker: Valentin Gushchin Title: Solution of the Problems of Nonhomogeneous Incompressible Fluid Dynamics by the CABARET Method
14:30-15:00	Speaker: Todor Gurov Title: An Integrated Software Package for Estimating Parameters of the Brown Bear (Ursusarctos L.) Population
15:00-15:30	Speaker: Dobri Dankov Title: Rarefied Gas Between Two Coaxial Cylinders – Transient Heat Transfer: The Effect of Pulsating Radial Motion of the Outer Cylinder. Acoustic Waves Modeling
15:30-16:00	Speaker: Leonid Makarenko Title: Finite Element and Finite Difference Algorithms for Calculations of Electron Energy Spectra in the System of Isolated Donor-Quantum Dot

14:00-16:00 Special Session GEOMETRICAL METHODS IN TECHNICAL AND NATURAL SCIENCES (Flamingo Grand Jaco Hall)
Chair: Volodymyr Kiosak

14:00-14:30	Speaker: Olexander Lesechko Title: Models of Mechanical Systems Preserving the Weyl Tensor
14:30-15:00	Speaker: Oksana Nikitenko Title: Geodesic Lines on the Cyclic Helical Surfaces
15:00-15:30	Speaker: Olena Gudyreva Title: <i>Mappings of Special Quasi-Einstein Spaces</i>
15:30-16:00	Speaker: Nina Vashpanova Title: Canonical Deformations of Pseudo-Riemannian Space
16:00-16:30	COFEE BREAK
16:30-17:30	Parallel Session NUMERICAL METHODS (Flamingo Grand Hall) Chair: Ivanka Zheleva
16:30-17:00	Speaker: Ion Malael Title: Drag Based Vertical Axis Wind Turbine Numerical Efficiency Evaluation
17:00-17:30	Speaker: Natalia Yaparova Title: Mathematical Model and Method for Calculating the Growth of Non-Metallic Inclusions in Multicomponent Melt
17:30-18:30	Parallel Session APPLIED PHYSICS (Flamingo Grand Hall) Chair: Ivanka Zheleva
17:30-18:00	Speaker: Jeni Vilag Title: Numerical Simulation of Alternative Fuels Combustion in Gas Turbines
18:00-18:30	Speaker: Adina Toma Title: Assessment of Optimal Tool Parameters used in Numerical Simulation for Hot Mandrel Bending of Pipe Elbows

16:30-17:30	Special Session GEOMETRICAL METHODS IN TECHNICAL AND NATURAL SCIENCES
	(Flamingo Grand Jaco Hall) Chair: Olexander Lesechko
16:30-17:00	Speaker: Sergey Pokas Title: Geometry of Riemannian Spaces of the 2nd Approximation
17:00-17:30	Speaker: Mykhailo Zarichnyi Title: Strong Topology on the Set of Persistence Diagrams
20:00	WELCOME PARTY – the lawn in front of Bailando bar MEETING POINT RECEPTION OF FLAMINGO GRAND HOTEL 19:50

# **FRIDAY, JUNE 21, 2019**

i08:30-09:30 PLENARY LECTURE: Yuri Bozhkov

Title: Equivalence Group for Generalized Kudryashov-

Sinelshchikov Equations of Second Order

(Flamingo Grand Hall) Chair: Michail Todorov

	Chair. Wichair 10dorov
09:30-10:00 COI	FEE BREAK
10:00-12:00	Parallel Session SCIENTIFIC COMPUTING (Flamingo Grand Hall) Chair: Yuri Bozhkov
10:00-10:30	Speaker: Natalia Vaganova/Mikhail Filimonov Title: Simulation of Thermal Effects of Engineering Objects and Climate Changes on the Permafrost Boundaries
10:30-11:00	Speaker: Borislav Stoyanov Title: Two Zaslavsky Maps in Pseudorandom Byte Generation
11:00-11:30	Speaker: Victoria Rayskin Title: Users Traffic on the Two-Sided Internet Platforms. Qualitative Study
11:30-12:00	Speaker: Evgenia Karepova Title: The Application of Special Hermite Finite Elements Coupled with Collocation to the 3D Poisson Equation
10:00-12:00	Parallel Session NUMERICAL METHODS (Flamingo Grand Jaco Hall) Chair: Tatyana Pukhancheva
10:00-10:30	Speaker: Natalia Kolkovska Title: Solitary Waves to Boussinesq Equation with Linear Restoring Force
10:30-11:00	Speaker: Lyudmila Prokudina/Dmitry Yaparov

	Title: Numerical Modeling of the Mass of the Flowing Liquid at Transverse Oscillations of the Straight Tube
11:00-11:30	Speaker: Ekaterina Genrikh Title: Hybrid Model of the Open Plasma Trap
11:30-12:00	Speaker: Veselina Vucheva Title: A Momentum Preserving Numerical Method for a Sixth Order Boussinesq Equation
12:00-14:00 LUI	NCH
	Flamingo Grand Hall Chair: Michail Todorov
14:00-14:45	KEYNOTE LECTURE: Hristo Kojouharov Title: <i>Mathematical Modeling of Bone Fracture Repair</i>
15:00-16:00	Parallel Session CONTINUUM MECHANICS (Flamingo Grand Hall) Chair: Victoria Rayskin
15:00-15:30	Speaker: Martin Nikolo Title: Measurements of Upper Critical Fields in Ni- and Co- and K- Doped Iron Based Pnictide Bulk Superconductors
15:30-16:00	Speaker: Alexandre Fedoseyev Title: Amplification of Longitudinal EM Waves in Graded Low- Epsilon Materials
15:00-16:00	Parallel Session BIOMATHEMATICS (Flamingo Grand Jaco Hall) Chair: Hristo Kojouharov
15:00-15:30	Speaker: Anna Antonova Title: Some Qualitative Properties of the Solutions of Goodwin's Equation with Fixed Delay

Speaker: Igor Fedotov - cancelled 15:30-16:00

Title: Identification of Holling-Tanner Model with Incomplete

Information about Model Parameters

16.00-1	16.30	COF	FFR	REAK
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16:00-16:30 COFEE BREAK		
16:30-19:00	Parallel Session APPLIED ANALYSIS (Flamingo Grand Hall) Chair: Anna Antonova	
16:30-17:00	Speaker: Vesela Mikhova Title: Price Forecasting and Risk Portfolio Optimization	
17:00-17:30	Speaker: Maya Markova Title: Foreign Exchange Rate Forecasting With Artificial Neural Networks	
17:30-18:00	Speaker: Iryna Hvozdeva Title: New Trend Criteria for Monitoring the Conditions of Technical Objects	
18:00-18:30	Speaker: Svetlana Zaitseva Title: <i>Noise-Induced Phantom Attractor in the Enzyme Kinetics</i>	
18:30-19:00	Speaker: Iliyana Raeva Title: Computation of Risk in Pricing of Investment Projects	
16:30-18:00	Parallel Session BIOMATHEMATICS (Flamingo Grand Jaco Hall) Chair: Hristo Kojouharov	
16:30-17:00	Speaker: Peter Hinow Title: Tiny Giants - Mathematics Looks at Zooplankton	
17:00-17:30	Speaker: Sylvi-Maria Gurova Title: Analysis of a Predator-Prey Model with SEIRS Epidemic in the Prey Population	

17:30-18:00	Speaker: Andrius Misiukas Title: Machine Learning Based EEG Classification by Diagnosis: Approach to EEG Morphological Feature Extraction
18:00-19:00	Parallel Session OTHERS (Flamingo Grand Jaco Hall) Chair: Hristo Kojouharov
18:00-18:30	Speaker: Dimitar Fidanov Title: Statistical Modeling of CuBr-Ne-HBr Laser Characteristics at High Repetition Frequency
18:00-18:30	Speaker: Atanas Ivanov Title: Two-Step Time Series Analysis for Air Pollution in Relation to Weather Conditions: Case Study of Nessebar, Bulgaria

# SATURDAY, JUNE 22, 2019

08:30-09:30 Flamingo Grand Hall

Chair: Michail Todorov

PLENARY LECTURE: Sergey Shmarev - telebridge with

Oviedo, Spain

Title: Higher Regularity of Solutions of Singular Parabolic

Equations with Nonstandard Growth

09:30-10:00 COFEE BREAK		
10:00-12:00	Parallel Session BIOMATHEMATICS Flamingo Grand Hall Chair: Peter Hinow	
10:00-10:30	Speaker: Gabriel Dimitriu Title: Processing Epidemiological Data Using Dynamic Mode Decomposition Method	
10:30-11:00	Speaker: Nicoleta Tarfulea Title: A Discrete Mathematical Model for Single and Collective Movement in Amoeboid Cells	
11:00-11:30	Speaker: Yulia Olevska Title: Fuzzy Recognition of Proteins in Population Genetics Electrophoresis Experiments	
11:30-12:00	Speaker: Gergana Nikolova Title: A Mathematical Model of the Human Thigh and Its Connection with the Torso	
10:00-12:00	Parallel Session MATHEMATICAL PHYSICS AND TRANSPORT PROCESSES (Flamingo Grand Jaco Hall) Chair: Vladimir Gerdjikov	
10:00-10:30	Speaker: Stefani Panayotova	

	Title: Some Analytical Solutions for Magnetic Flux Distribution in Long Josephson Junction with Second Harmonic in the Current Phase Relation
10:30-11:00	Speaker: Lyubomir Kovachev Title: Longitudinal Radiation Forces and Trapping of Particles in Femtosecond Pulses
11:00-11:30	Speaker: Daniela Georgieva Title: New Nonlinear Parametric Conversion Mechanism for Coherent THz Generation
11:30-12:00	Speaker: Boryana Nenova Title: Evolution of Ultra-Short Dark Solitons in Single Mode Optical Fibers

12:00-12:30 LUNCH		
12:30-19:00	EXCURSION TO THE ARCHEOLOGICAL MUSEUM IN VARNA, MUSEUM OF GLASS IN BELOSLAV, AND THE STONE PHENOMENON <i>STONE FOREST</i> NEAR VARNA	
19:30	BANQUET DINNER ETHNO-RESTAURANT OF SALT & PEPPER IN BALCHIK, MEETING POINT RECEPTION OF FLAMINGO GRAND HOTEL	

# **SUNDAY, JUNE 23, 2019**

08:30-09:30 PLENARY LECTURE: Vladimir Sadovsky

Title: Mathematical Modeling of Deformation of Structurally Inhomogeneous Materials Based on a Generalized Rheological Approach

(Flamingo Grand Hall) Chair: Michail Todorov

### 09:30-10:00 COFEE BREAK

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

10:00-10:30 Speaker: Ivan Zubko

Title: Material Symmetry Conjugated Spin and Deformation

Tensors for Orthotropic Media

10:30-11:00 Speaker: Igor Petrakov

Title: Identification of the Elastic Modules of a Fibrous

Composite by Solving Inverse Problems

11:00-11:30 Speaker: Sergey Meleshko – telebridge with Moscow, Russia

Title: Applications of the Group Analysis Method to the Oneand Two-Dimensional Gas Dynamics Equation in Lagrandian

Coordinates

11:30-12:00 Speaker: Irina Smolekho

Title: Numerical Modeling of the Dynamic Processes in Liquid

Crystals under the Action of Thermomechanical and

Electrostatic Perturbations

10:00-12:00 Special Session APPLIED ANALYSIS

(Flamingo Jaco Hall) Chair: Rossen Ivanov

10:00-10:30	Speaker: Boris Ananyev Title: A Motion Correction of Stochastic Evolutionary Systems with Uncertainties
10:30-11:00	Speaker: Elena Kostousova Title: On a Polyhedral Method of Solving an Evasion Problem for Linear Dynamical Systems
11:00-11:30	Speaker: Mikhail Gusev Title: External Estimates and Comparison Principle for Trajectory Tubes of Nonlinear Control Systems
11:30-12:00	Speaker: Yurii Bazylevych/Iryna Kostiushko Title: Matrices Diagonalization in Solution of Partial Differential Equation of the First Order
12:00-14:00 LUN	NCH
	Session PROBABILITY AND STATISTICS (Flamingo Grand Hall) Chair: Michail Todorov
14:00-14:45	KENOTE LECTURE: Lili Yang Title: Optimization of Fire Station Locations through Genetic Algorithms
	Special Session STATISTICS AND MODELING (Flamingo Grand Hall) Chair: Lili Yang
14:45-15:30	KENOTE LECTURE: Pavlina Jordanova Title: <i>Probabilities for p-Outliers - General Properties</i>
15:30-16:00	Speaker: Pavlina Jordanova/Milan Stehlik Title: Logarithm of Ratios of Two Order Statistics and Regularly Varying Tails

15:30-16:00	Parallel Session APPLIED ANALYSIS (Flamingo Grand Jaco Hall) Chair: Lili Yang
15:30-16:00	Speaker: Nevena Ilieva Title: A Novel 3D Visualization Approach: a Proof-of-Concept Study on the Histidine Residues in Myoglobin
16:00-16:30 COF	EE BREAK
16:30-17:00	Special Session "STATISTICS AND MODELING" (Flamingo Grand Hall) Chair: Pavlina Jordanova
16:30-17:00	Speaker: Venelin Todorov Title: A Comparison of Monte Carlo Methods Based on Faure and Sobol Sequences for Multidimensional Integrals in Air Pollution Modeling
17:00-18:30	Special Session "ADVANCES IN MODERN CONTINUUM MECHANICS. FREE BOUNDARY PROBLEMS" devoted to Professor Vladislav Pukhnachev jubilee (Flamingo Grand Hall) Chair: Vladimir Gerdjikov
17:00-17:30	Speaker: Alexander Korobkin Title: Impact onto Floating Ice
17:30-18:00	Speaker: Tatyana Khabakhpasheva Title: <i>Theoretical Model of Elastic Disc Lifting from a Water</i> Surface
18:00-18:30	Speaker: Anna Chugaynova Title: Longitudinal and Torsional Shock Waves in Anisotropic Elastic Cylinders
16:30-18:30	Parallel Session APPLIED ANALYSIS (Flamingo Grand Jaco Hall)

Chair: Iryna Hvozdeva

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16:30-17:00	Speaker: Andrei Tarfulea Title: Existence, Continuation, and Lower Mass Bounds for the Landau Equation
17:00-17:30	Speaker: Svetlana Zaitseva Title: <i>Order and Chaotic Regimes in 3D Goldbeter Model</i>
17:30-18:00	Speaker: Victor Olevsky Title: Application of Two-Dimensional Pade Approximants for Reducing the Gibbs Phenomenon
18:00-18:30	Speaker: Viktor Lyashenko/ Anton Zaika Title: Temperature Field Distribution in Spoke-Type Permanent Magnet Synchronous Machines
18:45	OFFICIAL DINNER IN RESTAURANT OF <i>RAI</i> , ALBENA, GATHERING POINT: <i>FLAMINGO GRAND</i> RECEPTION

# **MONDAY, JUNE 24, 2019**

08:30-09:30 PLENARY LECTURE: Rossen Ivanov

Title: Hamiltonian Approach to Nonlinear Water Waves – The

Long Wave Approximation

(Flamingo Grand Hall) Chair: Michail Todorov

09:30-10:00 COFEE BREAK

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10:00-12:00 Parallel Session APPLIED ANALYSIS

(Flamingo Grand Hall) Chair: Rossen Ivanov

10:00-10:30 Speaker: Mikhail Gusev

Title: *On Convexity of Small-time Reachable Sets of Nonlinear* 

Control Systems

10:30-11:00 Speaker: Petras Rupsys

Title: *Modeling Perspectives of Forest Growth and Yield:* 

Framework of Multivariate Diffusion Process

11:00-11:30 Speaker: Polina Yurovskih/ Boris Ananyev

Title: *On the Approximation of Estimation Problems for* 

Controlled Systems

11:30-12:00 Speaker: Dzhihan Menseidov

Title: Thermal and Electrical Characterization of

Nanocomposites with Carbon Particles

10:00-12:00 Parallel Session CONTINUUM MECHANICS

(Flamingo Grand Jaco Hall)

Chair: Boris Ananyev

10:00-10:30 Speaker: Andrei Kolyshkin

Title: On the Stability of a Steady Convective Flow Due to

Nonlinear Heat Sources in a Magnetic Field

10:30-11:00	Speaker: Olga Rozanova Title: <i>Ellipsoidal Vortices in Compressible Rotating Fluid</i>	
11:00-11:30	Speaker: Daria Kitaeva Title: On Task of Thick-Walled Aluminum Pipe under High Temperature Deformation	
11:30-12:00	Speaker: Alexey Zaitsev/ Ivan Zubko Title: Flexible Graphite as a Second-Grade Material	
12:00-14:00 LUNCH		
14:00-16:00	Parallel Session NUMERICAL METHODS (Flamingo Grand Hall) Chair: Alex Fedoseyev	
14:00-14:30	Speaker: Nicolae Tarfulea Title: Numerical Approach for a Class of Differential Equations with Constraints	
14:30-15:00	Speaker: Alexander Matviychuk Title: On One Applicability Criteria for Methods of Approximate Control System Reachable Set Construction	
15:00-15:30	Speaker: Todor Gurov Title: A Short-Term Interest Rate Merton's Model Influenced by a Risk Market Factor	
15:30-16:00	Speaker: Evgeniya Karepova Title: The Application of Special Hermite Finite Elements Coupled with Collocation to the 3D Poisson Equation	
14:00-15:30	Parallel Session MATHEMATICAL PHYSICS AND TRANSPORT PROCESSES (Flamingo Grand Jaco Hall) Chair: Olga Rozanova	

14:00-14:30	Speaker: Daniel Dantchev Title: Analytic Representation of the Order Parameter Profiles and Susceptibility of a Ginzburg-Landau Type Model with Dirichlet-Dirichlet Boundary Conditions on the Confining the Fluid Walls	
14:30-15:00	Speaker: Mikhail Filimonov Title: Application of Series with Recurrently Calculated Coefficients for Solving Initial-Boundary Value Problems for Nonlinear Wave Equations	
15:00-15:30	Speaker: Lyudmila Prokudina Title: Numerical Simulation of Nonlinear Development of Perturbations in a Thin Layer of a Viscous Liquid	
15:30-16:00	Speaker: Victoria Kornienko Title: Step-By-Step Nanostructures Formation under Uniform Laser Field	
16:00-16:30 COFEE BREAK		
16:30-18:30	Parallel Session NUMERICAL METHODS	
	(Flamingo Grand Hall) Chair: Ivan Lirkov	
16:30-17:00	· · · · · · · · · · · · · · · · · · ·	
16:30-17:00 17:00-17:30	Chair: Ivan Lirkov  Speaker: Victoria Kornienko/Vladimir Shaydurov Title: Numerical Methods for Mean Field Games with	
	Chair: Ivan Lirkov  Speaker: Victoria Kornienko/Vladimir Shaydurov Title: Numerical Methods for Mean Field Games with Discontinuous Control Function  Speaker: Marina Boronina Title: Computer Simulation of Plasma Dynamics in Open	

17:45-18:00	Speaker: Ivanka Zheleva/Irina Tsvetanova Title: Statistical Study of the Influence of the Atmospheric Characteristics upon the Particulate Matter (PM10) Air Pollution in the City of Silistra, Bulgaria
18:00-18:15	Speaker: Ivanka Zheleva/Ivan R. Georgiev Title: Numerical Study of the Influence of the Two-Burner Heating upon the Heat Transfer during Pyrolysis Process used for End-of-Life Tires Treatment
18:15-18:30	Speaker: Elitsa Raeva Title: Risk Estimation in Case of Limited the Insurance Liability
18:30-18:45	Dzhihan Menseidov Title: Automated Management System for the Temperature in a Pyrolysis Station Used for End-of-Life Tires Treatment
16:30-17:30	Special Session "ADVANCES IN MODERN CONTINUUM MECHANICS. FREE BOUNDARY PROBLEMS" devoted to Professor Vladislav Pukhnachev jubilee (Flamingo Grand Jaco Hall) Chair: Vladislav Pukhnachev
16:30-17:00	Speaker: Evgeniy Magdenko Title: Axial Convection of Two Immiscible Fluids in a Vertical Tube
17:00-17:30	Speaker: Sergei Osipov Title: Some Challenges in Oilfield Development

# **TUESDAY JUNE 25, 2019**

08:30-09:30 PLENARY LECTURE: Georgi Grahovski Title: On the Derivative Nonlinear Schrödinger Equation Related to Symmetric Spaces (Flamingo Grand Hall) Chair: Michail Todorov 09:30-10:00 COFEE BREAK Session SCIENTIFIC COMPUTING 10:00-12:00 (Flamingo Grand Hall) Chair: Georgi Grahovski 10:00-10:30 Speaker: Ivan Lirkov Title: Performance Analysis of Hybrid Parallel Solver for 3D Stokes Equation on Intel Xeon Computer System Speaker: Oxana Sadovskaya 10:30-11:00 Title: Supercomputing Analysis of Seismic Efficiency of the Electromagnetic Pulse Source "Yenisei" 11:00-11:30 Speaker: Alexandre Fedoseyev Title: Radiation Effects in Space Silicon Solar Cells: Numerical Models and Software Speaker: Biser Tsvetkov 11:30-12:00 Title: Using Smart Contracts for Software Lifecycle Management Automation

10:00-12:00 Session NUMERICAL METHODS

(Flamingo Grand Jaco Hall) Chair: Daniel Dantchev

10:00-10:30 Speaker: Svetlana Tikhovskaya

Title: Solving an Elliptic Problem with Regular and Parabolic

	Boundary Layers by a Multigrid Algorithm
10:30-11:00	Speaker: Alexander Matviychuk Title: An Algorithm for Estimating Reachable Set of Control System under Uncertainties
11:00-11:30	Speaker: Stavros Meskos/Stefan Stefanov Title: A Direct Simulation Monte Carlo Approach on Riemann Problems in Gas Dynamics
12:00	RECAPITULATION, NOMINATIONS AND OFFICIAL CLOSING SESSION OF THE CONFERENCE (Flamingo Grand Hall)
12:00	GOOD-BYE COFEE BREAK
13:30	EXCURSION TO THE BOTANIC GARDEN IN BALCHIK AT YOUR OWN