
MASTER PROGRAM

for

**FIFTEENTH INTERNATIONAL HYBRID CONFERENCE
APPLICATION OF MATHEMATICS IN TECHNICAL AND NATURAL
SCIENCES
JUNE 21-26, 2023**

**All times in the program are GMT+3 (East-European time). Please
synchronize your local time with respect to GMT and join the announced
Zoom sessions on time.**

WEDNESDAY, JUNE 21, 2023

FLAMINGO GRAND HALL

Join Zoom Meeting **08:00-12:30**

<https://us02web.zoom.us/j/81052014537?pwd=SjNZc0RYVlhiQUh5Q05wbjNrVEJ6UT09>

Meeting ID: 810 5201 4537

Passcode: 401912

Hosted by Michail Todorov

08:30-09:00 OPENING SESSION

09:00-10:00 PLENARY LECTURE: Daniel Danchev
Title: *Analytical and Numerical Results on Fluctuation-Induced
Casimir and Helmholtz Forces*

10:00-10:30 BREAK

10:30-11:30 PLENARY LECTURE: Shou-Fu Tian

Title: *Soliton Resolution for the Complex Short Pulse Equation with Weighted Sobolev Initial Data in Space-Time Solitonic Regions*

11:30-12:30 Parallel Session NUMERICAL METHODS

Hosted by Michail Todorov and Daniel Danchev

11:30-12:00 Speaker: Alexey Rukavishnikov
Title: *On a Numerical Method for Solving a Non-Stationary Problem of Hydrodynamics with an Angular Singularity*

12:00-12:30 Speaker: Yana Gurimskaya
Title: *Radiation Effect Model for Ultrathin Silicon Solar Cells*

Lunch Break

Join Zoom Meeting 13:45-18:00

<https://us02web.zoom.us/j/88550468635?pwd=d0VHZIBoUDE4NGhaL2NwSGdUbTd0dz09>

Meeting ID: 885 5046 8635

Passcode: 204833

Hosted by Michail Todorov

14:00-16:00 Session NUMERICAL METHODS

14:00-14:30 Speaker: Miglena Koleva
Title: *Reconstruction of the Time-Dependent Right-Hand Side in Parabolic Equations on Disjoint Intervals*

14:30-15:00 Speaker: Luben Vulkov
Title: *Numerical Reconstruction of the Mortality Rate of the Forager Bees in a Spatial Model of Pesticide Free*

15:00-15:30 Speaker: Valerii Dryuma - non presented
Title: *On the 14D Riemann Metric Associated with Navier-Stokes Equations and Its Applications*

15:30-16:00 Speaker: Byulent Idirizov
Title: *Predictive Modelling and Time Series Analysis of FAO Food Price Index*

Break

16:30-18:00 Session NUMERICAL METHODS

16:30-17:00 Speaker: Rodrigo Vejar
Title: *Finite Difference Scheme for a Higher Order Nonlinear Schrödinger Equation with Periodic Boundary Conditions*

17:00-17:30 Speaker: Alex Fedoseyev
Title: *Improving the Space Silicon Solar Cell Efficiency by Down-converting UV Light to Visible with Adding the Layer of Polymer Nanocomposite*

17:30-18:00 Speaker: Muhhamad Siddiqui
Title: *Euler Elastic Model & Its Treatment*

20:00 WELCOME PARTY – BAILANDO BAR, FLAMINGO
GRAND HOTEL

CORELA HALL: Parallel Zoom Session

Join Morning 2 Zoom Meeting **11:30-12:30**

<https://essex-university.zoom.us/j/92040184669>

Meeting ID: 920 4018 4669

Hosted by Georgi Grahovski and Shou-Fu Tian

11:30-12:30 Special Session ALGEBRAIC AND GEOMETRIC ASPECTS
OF INTEGRABLE SYSTEMS

11:30-12:00 Speaker: Jin-Jie Yang
Title: *Riemann-Hilbert Problem for the Focusing Nonlinear Schrödinger Equation with Multiple High-Order Poles under Nonzero Boundary Conditions*

12:00-12:30 Speaker: Zhi Quang Li
Title: *Inverse Scattering Transform and Soliton Solutions for the Modified Matrix Korteweg-de Vries Equation with Nonzero Boundary Conditions*

Lunch Break

Join Afternoon 1 Zoom Meeting **15:30-16:00**

<https://essex-university.zoom.us/j/95733750048>

Meeting ID: 957 3375 0048

Hosted by Georgi Grahovski and Vesselin Vachev

15:30-16:00 Special Session ALGEBRAIC AND GEOMETRIC ASPECTS
OF INTEGRABLE SYSTEMS

15:30-16:00 Speaker: Enrique Reyes
Title: *The Kadomtsev-Petviashvili Hierarchy on Equation Manifolds*

20:00

WELCOME PARTY – BAILANDO BAR, FLAMINGO
GRAND HOTEL

THURSDAY, JUNE 22, 2023

FLAMINGO GRAND HALL

Join Zoom Meeting **08:15-12:30**

<https://us02web.zoom.us/j/88915951876?pwd=eFRNanRaN0s4MzByVURiSWlQOTdtUT09>

Meeting ID: 889 1595 1876

Passcode: 785980

Hosted by Michail Todorov

08:30-09:30 SREAKER: Alex Fedoseyev
Title: *Approximate Analytical Solution for Turbulent Flow in Channels*
Title: *Improving the 3-Junction and 2-Junction Solar Cell Efficiency by Additional Down-Converting UV Light to Visible*

09:30-10:00 BREAK

10:00-12:30 Session SCIENTIFIC COMPUTING

10:00-10:30 Speaker: Nevena Ilieva
Title: *In silico Insight into the Multifaceted Role of the Electric Charge in the Activity of the Antimicrobial Peptides*

10:30-11:00 Speaker: Xubiao Peng
Title: *Using Replica Exchange Molecular Dynamics for Quantitative Study of Graft Mimics with Varying Topology*

11:00-11:30 Speaker: Elena Lilkova
Title: *In Silico Study of the Mechanism of Action of SARS-CoV-2 ORF6*

- 11:30-12:00 Speaker: Djihan Menseidov
Title: *Mathematical Modeling of Carbon Nanoparticle Distribution in Polymer Composites for High Electrical Conductivity: Implications for Green Technologies*
- 12:00-12:30 Speaker: Djihan Menseidov
Title: *Preparation and Evaluation of Carbon Nanoparticle-Polymer Composites for High Electrical Conductivity in Green Technologies*

Lunch Break

FLAMINGO GRAND HALL

Join Zoom Meeting **13:45-17:30**

<https://us02web.zoom.us/j/83796057999?pwd=M3ZnNEViSFRqanp3eWZVaHNRR1JQQT09>

Meeting ID: 837 9605 7999

Passcode: 889344

Hosted by Michail Todorov

14:00-16:00 Session SCIENTIFIC COMPUTING

- 14:00-14:30 Speaker: Valentin Gushchin
Title: *Peculiar Properties of Current Function Fields for a Spots Chain with Intervals in a Stratified Fluid*
- 14:30-15:00 Speaker: Venelin Todorov
Title: *Air Pollution Modeling of UNI-DEM Model by Using Innovative Stochastic Approaches*
- 15:00-15:30 Speaker: Dimitar Slavchev
Title: *Parallel Scalability of Sparse Solvers for Sparsified Fractional Diffusion FEM Systems*
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15:30-16:00 Speaker: Tz. Ostromsky
Title: *Numerical Modeling and Applications in Using the
Computing Power of the Petascale Supercomputer Discoverer*

Coffee Break

FLAMINGO GRAND HALL

16:30-17:30 Session SCIENTIFIC COMPUTING

16:30-17:00 Speaker: Stoyan Apostolov
Title: *Hybrid "Walk on Equations" Monte Carlo Algorithm for
Linear System*

17:00-17:30 Speaker: Slavi Georgiev
Title: *Numerical Determination of Time-Dependent Volatility
for Strike Asian Options from Price Measurements*

17:30-18:00 Speaker: Stoyan Apostolov
Title: *Lipschitz Properties of Graphical Derivatives of Set-
Valued Mappings*

FRIDAY, JUNE 23, 2023

Flamingo Grand Hall

Join Zoom Meeting **08:15-12:30**

<https://us02web.zoom.us/j/82851208579?pwd=NGRRZitpck1zUEYvdKxnZFhxZk5TQT09>

Meeting ID: 828 5120 8579

Passcode: 407974

Hosted by Michail Todorov

08:30-09:30 PLENARY TALK

Speaker: Runzhang Xu - nonpresented

Title: *Global Existence and Blow Up of Solutions for Pseudo-Parabolic Equation with Singular Potential*

Coffee Break

10:00-12:30 Session APPLIED ANALYSIS

10:00-10:30 Speaker: Yuri Bozhkov

Title: *Modern Group Analysis of Ricci Flows*

10:30-11:00 Speaker: Vessela Mihova

Title: *Assessing the Impact of Speed and Type of Road Surface on the Noise Level in a Passenger Car Cabin*

11:00-11:30 Speaker: Vanyo Donev - nonpresented

Title: *Asymptotic Behavior of the Non-oscillating Solutions of First Order Nonlinear Impulsive Functional-Differential Equations of Neutral Type*

11:30-12:00 Speaker: Atanas Ivanov

Title: *Temporal-Causal Modeling of Air Pollution in the City*

of Plovdiv, Bulgaria: A Case Study

12:00-12:30

Speaker: Yu-Fen Chang

Title: *Flowpattern in Hydrocyclones: Numerical Simulations with Experimental Verification*

Lunch Break

13:30

Excursion to the town of Shumen, the historical monuments, and the observatory

Meeting point: the lounge of Flamingo Grand Hotel at 13:20.
Everybody are welcome.

Corella Hall

Join Morning 2 Zoom Meeting 11:00-12:30

<https://essex-university.zoom.us/j/92040184669>

Meeting ID: 920 4018 4669

Hosted by Georgi Grahovski

10:30-11:00 Parallel Session NUMERICAL METHODS

10:30-11:00

Speaker: Aarne Pohjonen

Title: *Moving Iso-Contour Method for Solving Partial Differential Equations*

11:00-12:30

Parallel Session MATHEMATICAL PHYSICS AND TRANSPORT PROCESSES

11:00-11:30

Speaker: Viktor Olevskiy

Title: *Raster Image Processing Using 2D Padé-Type Approximations*

11:30-12:00

Speaker: Marios Christou

Title: *Christov Expansion Method for Nonlocal Nonlinear Evolution Equations*

12:00-12:30

Speaker: Nikolai Kutev

Title: *Nonexistence of the Weak Solutions to Some Nonlinear Hyperbolic Equations*

Lunch Break

13:30

Real Excursion to the town of Shumen, the historical monuments, and the observatory

Meeting point: the lounge of Flamingo Grand Hotel at 13:20.
Everybody are welcome.

SATURDAY, JUNE 24, 2023

FLAMINGO GRAND HALL

Join Zoom Meeting **08:15-12:30**

<https://us02web.zoom.us/j/88033202879?pwd=NG8zQURFVm1OTGxlTDhQa0Z2V3dCU T09>

Meeting ID: 880 3320 2879

Passcode: 929219

Hosted by Michail Todorov and Zhijun (George) Qiao

08:30-09:30 PLENARY LECTURE: Weipeng Hu
Title: *Structure-Preserving Approach for Non-Conservative System*

09:30-10:00 BREAK

10:00-12:30 Special Session ALGEBRAIC AND GEOMETRIC ASPECTS
OF INTEGRABLE SYSTEMS

10:00-10:30 Speaker: Zhijun (George) Qiao
Title: *High Order Integrable Peakon Models and Peakon Solutions in Non-traveling Wave Type*

10:30-11:00 Speaker: Vesselin Vachev
Title: *On Multi-Fission Interaction of Traveling Waves for the Two-Dimensional Euler Equations*

11:00-11:30 Speaker: Bogdan Dimitrov
Title: *Algebraic Geometry and Elliptic Integrals Approach for Calculation of the Propagation Time of a Signal Between GPS Satellites with Account of General Relativity Theory*

11:30-12:00 Speaker: Xuedong Chai
Title: *Application of the ∂ -Dressing Method for Nonlinear Evolution Equations*

12:00-12:30 Speaker: Hongyi Zhang
Title: *Spectral Analysis and Long-Time Asymptotics of Complex mKdV Equation*

Lunch Break

Join Zoom Meeting **13:45-18:00**

<https://us02web.zoom.us/j/83220480145?pwd=ZFErUjU3Z0puVkxZandjY0wyRDdCQT09>

Meeting ID: 832 2048 0145

Passcode: 028119

Hosted by Michail Todorov and Vesselin Vachev

14:00-16:00 Special Session ALGEBRAIC AND GEOMETRIC ASPECTS
OF INTEGRABLE SYSTEMS

14:00-14:30 Speaker: Jalil Ouazzani
Title: *Development of a Three-Phase Solver for VOF Methods into the PHOENICS Code*

14:30-15:00 Speaker: Walter Mudzimbabwe
Title: *A Policy Iteration Approximation for Stochastic Optimal Control with Random Coefficients*

15:00-15:30 Speaker: Georgi Grahovski
Title: *On the N-Wave Type Equations and Their Gauge Equivalent*

15:30-16:00 Speaker: Vladimir Gerdjikov
Title: *On Soliton Solutions and Soliton Interactions of Kulish-Sklyanin and Hirota-Ohta Systems*

Break

Hosted by Michail Todorov

16:30-18:00 Session APPLIED ANALYSIS

16:30-17:00 Speaker: Nectarios Papanicolaou
Title: *Orthonormal Eigenfunction Expansions for Sixth-Order
Boundary Value Problems*

17:00-17:30 Speaker: Georgi Boyadzhiev
Title: *Application of Maximum and Comparison Principles for
Systems of Elliptic and Parabolic PDEs with Fully Non-Linear
Principle Symbol*

17:30-18:00 Speaker: Ivan R. Georgiev
Title: *New Stochastic Approaches for European Option
Pricing*

19:00 Official Dinner – fish restaurant of Danton, near Varna
Meeting point in front of the Flamingo Grand hotel at 18:50

PARALLEL SESSION CORELLA HALL

Join Afternoon 1 Zoom Meeting **14:00-16:00**
<https://essex-university.zoom.us/j/95733750048>

Hosted by Georgi Grahovski

14:00-16:00 Session BIOMATHEMATICS

14:00-14:30 Speaker: Gergana Nikolova
Title: *Mathematical and Computer Modeling of Age Changes of Basic Anthropometric and Mass-Inertial Characteristics of Bulgarian Females*

14:30-15:00 Speaker: Todor Gurov
Title: *Speciation and Historical Migration Pattern Interaction: Examples from Pinus Nigra and Pinus Sylvestris Phylogeography*

15:00-15:30 Speaker: Silvi-Maria Gurova
Title: *Study of the Spread of Covid-19 for the Last Three Years in Bulgaria*

15:30-16:00 Speaker: Meglena Lazarova
Title: *Application of Neural Networks for Modeling of Biological Data*

Break

PARALLEL SESSION CORELLA HALL

Join Afternoon 2 Zoom Meeting **16:30-17:30**
<https://essex-university.zoom.us/j/99184621459>

Hosted by Georgi Grahovski

16:30-17:30 Session BIOMATHEMATICS

16:30-17:00 Speaker: Alexander Kirilov
Title: *A System for Bioinformatics Processing of Metagenomic Data*

17:00-17:30 Speaker: Andrey Vassilev
Title: *Logistic Probability Function: An Analysis and Modification from the Perspective of Reaction Network Theory*

19:00 Official Dinner – fish restaurant of Danton, near Varna
Meeting point in front of the Flamingo Grand hotel at 18:50

SUNDAY, JUNE 25, 2023

FLAMINGO GRAND HALL

Join Zoom Meeting **08:15-12:30**

<https://us02web.zoom.us/j/88652520069?pwd=S08xdktPdjZLY1ZLZWl0azJ6MEFFUT09>

Meeting ID: 886 5252 0069

Passcode: 965805

Hosted by Michail Todorov

08:30-09:30 PLENARY LECTURE: Hongyu Liu
Title: *Spectral Geometry of Transmission Resonances and Applications*

09:30-10:00 BREAK

10:00-12:30 Session CONTINUUM MECHANICS

10:00-10:30 Speaker: Ivan Christov
Title: *Two-Way-Coupled Oscillatory Flows in Compliant Conduits at Arbitrary Womersley Number*

10:30-11:00 Speaker: Alexander Kerzhaev
Title: *An Exact Solution to the Inhomogeneous Problem for an Elastic Strip with Mixed Boundary Conditions*

11:00-11:30 Speaker: Todor Zhelyazov
Title: *Modeling the Local Failure in a Viscoelastic Material*

11:30-12:00 Speaker: Ganna Shyshkanova
Title: *Simple Layer Potential Expansion for Optimization of Contact Interaction Taking into Account Friction and Adhesion*

12:00-12:30 Speaker: Olena Korotunova

Title: *Mathematical Modeling of Cylindrical Structures under Impulse Loading*

Lunch Break

Join Zoom Meeting 13:45-18:30

<https://us02web.zoom.us/j/87167077051?pwd=RVM5T0JiQ1phVFdUdVVzNUVvRVNYUT09>

Meeting ID: 871 6707 7051

Passcode: 186449

Hosted by Michail Todorov and Milan Stehlik

14:00-16:00 Special Session STATISTICS AND MODELING

14:00-14:30 Speaker: Milan Stehlik
Title: *Transformations and Learning*

14:30-15:00 Speaker: Przemyslaw Holda
Title: *Investigating Emergent Social Network Properties Through Agents Assembly Simulation*

15:00-15:30 Speaker: Roman Haynatzki
Title: *Building Machine Learning Models to Improve Hypertension Diagnosis*

15:30-16:00 Speaker: Polina Yaneva
Title: *Furniture Market Demand Forecasting Using Machine Learning*

16:00-16:30 Break

16:30-18:30 Special Session STATISTICS AND MODELING

16:30-17:00 Speaker: Pavlina Jordanova
Title: *Mixed Poisson Process with Stacy Mixing Variable*

- 17:00-17:30 Speaker: Stoianka Koleva
Title: *Stochastic Modeling of Daily Air Pollution in Burgas, Bulgaria*
- 17:30-18:00 Speaker: Antoaneta Yordanova
Title: *Ensemble Methods with Machine Learning for Predictive Modeling of Milk Yield for Holstein Cows*
- 18:00-18:30 Speaker: Velichka Traneva
Title: *Intuitionistic Fuzzy Seasonal Variation Analysis of Marine Biotoxin Distribution in the Black Sea*

CORELLA HALL

Join Morning 2 Zoom Meeting 11:00-12:30
<https://essex-university.zoom.us/j/92040184669>

Hosted by Georgi Grahovski

- 11:00-12:30 Parallel Session SCIENTIFIC COMPUTING
- 11:00-11:30 Speaker: Oleksandr Olevskyi
Title: *Approaches for Improvement of Reliability of the Prony's Method Computation*
- 11:30-12:00 Speaker: Yuri Dimitrov
Title: *Convergence of the L_1 Two-Term Equation Scheme*
- 12:00-12:30 Speaker: Svetoslav Hadzhiivanov
Title: *Improving Algorithmic Trading in Cryptocurrencies with ChatGPT-4: Developing a Grid Trading Bot for Optimal Performance in Diverse Market Conditions*

Lunch

Join Afternoon 1 Zoom Meeting 14:00-15:30
<https://essex-university.zoom.us/j/95733750048>

Hosted by Georgi Grahovski

14:00-14:30 Session CONTINUOUS MECHANICS

14:00-14:30 Speaker: Dobri Dankov
Title: *Oscillating Flow of Rarefied Viscous Gas between
Cylinders with Finite Length. Numerical Study*

14:30-16:00 Parallel Session APPLIED ANALYSIS

14:30-15:00 Speaker: Miroslav Stoenchev
Title: *Symmetric Diophantine Systems and Perfect Cuboids*

15:00-15:30 Speaker: Irina Minkova
Title: *Statistic Study of Particulate Matter Air Contamination in
the City of Vidin, Bulgaria*

15:30-16:00 Speaker: Mariana Nikolova
Title: *Statistic Study of Gaseous Air Contamination in the City
of Svishtov, Bulgaria*

Break

Join Afternoon 2 Zoom Meeting **16:30-17:30**
<https://essex-university.zoom.us/j/99184621459>

Hosted by Georgi Grahovski

16:30-17:30 Parallel Session SCIENTIFIC COMPUTING

16:30-17:00 Speaker: Luiza Debska
Title: *Development of a Modification of the Original Thermal
Comfort Model*

17:00-17:30

Speaker: Luiza Debska

Title: *Mathematical Description of Subjective Symptoms of
“Sick Building Syndrome”*

17:30-18:00

Speaker: Meglena Lazarova

*A Structure-Activity Modelling Relationship among Mu-Opioid
Compounds using Machine Learning*

MONDAY JUNE 26, 2023

FLAMINGO GRAND HALL

Join Zoom Meeting **08:15-12:30**

<https://us02web.zoom.us/j/87920304139?pwd=ZUd3S29EcXdjZ3puZk5TVDhDLzZM5dz09>

Meeting ID: 879 2030 4139

Passcode: 515210

Hosted by Michail Todorov

08:30-09:15 KEYNOTE TALK: Anna Dembinska
Title: *Numbers of Observations near Order Statistics and Record Values*

09:15-9:45 BREAK

09:45-11:15 Special Session MATHEMATICAL MODELS IN RELIABILITY THEORY

09:45-10:15 Speaker: Krzysztof Jasinski
Title: *On the Number of Failed Components in a Working Coherent System under Inspections*

10:15-10:45 Speaker: Agnieszka Goroncy
Title: *Extreme Spacings and Expectation Bounds Based on the Decreasing Reversed Failure Rate Distributions*

10:45-11:15 Speaker: Nikolay Nikolov
Title: *Maximum Product of Spacings Method under Type-I Censoring with Application to a Weibull Step-Stress Model*

11:15-12:00 RECAPITULATION AND OFFICIAL CLOSING SESSION OF THE CONFERENCE

12:00-13:00 *Virtual Trip for the on-line participants*

Guided by Tzvetan Ostromsky

12:00-13:00

Good Bye Party for the off-line participants
