# MASTER PROGRAM

for

## SIXTEENTH INTERNATIONAL CONFERENCE
## *APPLICATION OF MATHEMATICS IN TECHNICAL AND NATURAL SCIENCES*
## JUNE 21-26, 2024

**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.**

## FRIDAY, JUNE 21, 2024

**FLAMINGO GRAND HALL**

Join Zoom Meeting 08:30-12:00
https://us02web.zoom.us/j/87800599688?pwd=ZVROfsobhiIjWAQyjGxZz6BHThxFRO.1

Meeting ID: 878 0059 9688
Passcode: 639853

Hosted by Michail Todorov

08:30-09:00      OPENING SESSION

09:00-10:00      PLENARY LECTURE: Alexander Mikhailov
               Title: *Commutative Poisson Algebras from Deformations of Noncommutative Algebras and Non-Abelian Hamiltonian Systems*

10:00-10:30 BREAK

| 10:30-11:15 | KEYNOTE TALK: Na Wang |
| | Title: *Affine Yangian and 3D Young Diagrams* |

| 11:15-12:00 | KEYNOTE TALK: Jifeng Chu |
| | *Sharp Bounds for All Nodes of Sturm-Liouville Operators* |

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Lunch Break

Join Zoom Meeting 14:00-18:30

https://us02web.zoom.us/j/84313382068?pwd=cJrstZTEZZRgAU3zqVibasf4zvMMWs.1

Meeting ID: 843 1338 2068
Passcode: 525656

Hosted by Michail Todorov

Session SCIENTIFIC COMPUTING

| 14:00-14:30 | Speaker: Alex Fedoseev (Gurimskaya) |
| | Title: *Combined Electron and Proton Radiation Effects on Solar Cells for Earth Orbit* |

| 14:30-15:00 | Speaker: Alex Fedoseyev |
| | Title: *Simulation of Space Radiation-Induced Defects in Silicon Solar Cell Using Density-Functional Theory* |

Session BIOMATHEMATICS

| 15:00-15:30 | Speaker: Ivan R. Georgiev |
| | Title: *Advanced Stochastic Method for Finance Applications* |

| 15:30-16:00 | Speaker: Anna Antonova |
| | Title: *Analysis of Oscillations for the Goodwin Business Cycle Model with Discrete Delay and Distributed Delay in Induced Investment* |

Break

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Session BIOMATHEMATICS

16:30-17:00        Speaker: Jincai Chang
                   Title: *Visual Analysis of Flow and Diffusion of Hemolytic Agents and Hematomas*

17:00-17:30        Speaker: Gergana Nikolova (Daniel Dantchev)
                   Title: *Mathematical Modeling of the Human Head and Neck: Problems and Possible Solutions*

Session NUMERICAL METHODS

17:30-18:00        Speaker: Stoyan Apostolov
                   Title: *Improved Unbiased Stochastic Method for Fredholm Integral Equations t*

18:00-18:30        Speaker: Venelin Todorov
                   Title: *Environmental Modeling by Using Advanced Stochastic Approaches*
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20:00              WELCOME PARTY – RESTAURANT, FLAMINGO
                                    GRAND HOTEL

**SATURDAY, JUNE 22, 2024**

**FLAMINGO GRAND HALL**

Hosted by Michail Todorov

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|---|---|
| 08:30-09:30 | PLENARY SREAKER: Xiyin Wang<br>Title *Mathematical Modelling of Life Evolution and Epidemic Crisis* |

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09:30-10:00 BREAK

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|---|---|
| 10:00-12:30 | Session SCIENTIFIC COMPUTING |
| 10:00-10:30 | Speaker: Tomas Plachetka<br>Title*: Object-Oriented Zero-Information-Optimised Product of Monte Carlo Integrations* |
| 10:30-11:00 | Speaker: Oleksandr Olevskyi<br>Title: *Technology of Using the Matrix Pencil Method for Processing Data with Impulse Noice* |
| 11:00-11:30 | Speaker: Yuliia Olevska<br>Title: *Acoustic Recognition of Anthropogenic Underground Voids Using Machine Learning Methods* |
| 11:30-12:00 | Speaker: Nevena Ilieva<br>Title: *Understanding Biological Data Through in silico Studies: Strategies for Targeted Antiviral Therapies* |
| 12:00-12:30 | Speaker: Byulent Idirizov<br>Title*: Effective Signal Denoising with Adaptive Polynomials* |

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Lunch Break

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**FLAMINGO GRAND HALL**

14:00-16:00        Session SCIENTIFIC COMPUTING

14:00-14:30        Speaker: Valentin Gushchin
                   Title: *Mathematical Modeling of the Vortex Couple Dynamics
                    in a Stratified Fluid*

14:30-15:00        Speaker:Velichka Traneva
                   Title: *Entropic EMPIRISM in Describing the State of the
                   Complex System: Biosphere-Technosphere-Noosphere and
                   Human Health*

15:00-15:30        Speaker: Stoyan Tranev
                   Title: *An Intercriteria Approach to Assessing the Impact of Air
                   Pollutants on Premature Deaths in the European Union*

15:30-16:00        Speaker: Tz. Ostromsky
                   Title: *Air Pollution Modelling of Accidents Involving
                   Hazardous Substances*

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Coffee Break

**FLAMINGO GRAND HALL**

16:30-17:30        Session SCIENTIFIC COMPUTING

16:30-17:00        Speaker: Alex Fedoseev
                   Title*: Minimization Principle for Analytical Solution of
                    Turbulent Flow in Channels*

17:00-17:30        Speaker: Nikolai Kovachev
                   Title: *Modeling of the Noise Emissions of Centrifugal Fan with*

*Different Impellers Geometry*

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|---|---|
| 17:30-18:00 | Speaker: Vesela Mihova<br>Title*: On the Estimation of Uncertainty in Noise Studies of a Centrifugal Fan* |
| 18:00-18:30 | Speaker: Ganna Shyshkanova<br>Title*: On Solving and Optimizing 3D Contact Problems Taking the Nonlinear Law of Roughness Deformation into Account* |

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## CORELLA HALL

Join Zoom Meeting <mark>10:00-15:00</mark>
https://essex-university.zoom.us/j/92040184669

Meeting ID: 920 4018 4669

Hosted by Georgi Grahovski

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|---|---|
| 10:00-12:30 | Session APPLIED ANALYSIS |
| 10:00-10:30 | Speaker: Pengcheng Niu<br>Title*: On Oppermann Conjecture* |
| 10:30-11:00 | Speaker: Dongmei Liu<br>Title: *Structural Morphologies on the Molecular Parameters of PLGA-b-PEG-b-PLGA and D* |
| 11:00-11:30 | Speaker: Chenxi Wang<br>Title: *ASQEAIR: An Improved Infectious Disease Dynamics Model* |
| 11:30-12:00 | Speaker: Wang Yao<br>Title: *Research on the Difference of Plant Evolutionary Rates Based on Semiparametric Model* |

12:00-12:30        Speaker: Yongchao Jin
                   Title*: Infectious Disease Prediction Based on Statistics and*
                    *Deep Learning Models*

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                   Lunch Break

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14:00-15:00        Session SCIENTIFIC COMPUTING

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14:00-14:30        Speaker: Hongwang Yuan
                   Title: *Solving Nonlinear Wave Equations Based on*
                   *Barycentric Lagrange Interpolation*

14:30-15:00        Speaker: Slavi Georgiev
                   Title: *First Order Approximation of First Derivative and*
                    *Applications*

**SUNDAY, JUNE 23, 2024**

**Flamingo Grand Hall**

Join Zoom Meeting <mark>08:30-12:30</mark>

https://us02web.zoom.us/j/84601098505?pwd=MjspetBznMAdIUArHovomxLKlcuT6U.1

Meeting ID: 846 0109 8505
Passcode: 505146

Hosted by Michail Todorov

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|---|---|
| 08:30-09:30 | PLENARY TALK |
| | Speaker: Zhijun Qiao |
| | Title: *A Large Class of Two-Component Peakon Systems and Reductions* |
| 09:30-10:00 | Coffee Break |
| 10:00-12:30 | Session APPLIED ANALYSIS |
| 10:00-10:30 | Speaker: Yuri Bozhkov/Michail Todorov |
| | Title: *Group Classification and Numerical Solutions of Gross-Pitaevskii Systems* |
| 10:30-11:00 | Speaker: Atanas Ivanov |
| | Title: *Exploring SO2 Air Pollution in Plovdiv Through Multivariate Adaptive Regression Splines* |
| 11:00-11:30 | Speaker: Elitca Raeva |
| | Title: *Mathematical Modeling of the Operation of a Hydrophoric Installation* |
| 11:30-12:00 | Speaker: Qichuan Xia |
| | Title: *Mathematical Modeling and Enhancing the Carrying Capacity of National Parks in the United States* |

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| 12:00-12:30 | Speaker: Vanyo Donev<br>Title: *Criteria for Oscillation of Bounded Solutions of Quasi-Linear Second-Order Impulsive Functional-Differential Equations of Neutral Type with Variable Coefficients* |

Lunch Break

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| 14:00 | Excursion to the town of Shumen and the ruins of stronghold on the plateau<br><br>Meeting point: the lounge of Flamingo Grand Hotel at 13:45. Everybody are welcome. |

**MONDAY, JUNE 24, 2024**

Join Zoom Meeting <mark>08:30-18:30</mark>

https://us02web.zoom.us/j/89844050162?pwd=MTOA7rCVPOqHL1Ia1MS7KzW0rhpZeg.1

Meeting ID: 898 4405 0162
Passcode: 771778

Hosted by Michail Todorov

**Flamingo Grand Hall**

08:30-09:30      PLENARY TALK

                      Speaker: Jing Li & Xiaodong Yang
                      Title: *Dynamical Modeling of GYRO Metastructure*

                      Coffee Break

10:00-10:30      Session E-LEARNING

10:00-10:30      Speaker: Meglena Lazarova/Michail Todorov
                      Title: *Double Laplace Transform applied to the PDE of the*
                      *Non-ruin Probability in case of a Bivariate Polya-Aeppli*
                      *Counting Process and exponentially distributed claims*

10:30-11:00      Speaker: Roman Haynatzki
                      Title: *Exploring Predictive Models in Myocardial Infarction: A*
                      *Comparative Study of LASSO Logistic Regression and XGBoost*
                      *within a Causal Mediation Framework*

11:00-11:30      Speaker: Irina Naskinova
                      Title: *Forecasting Strategies in Retail: Utilizing Advanced*

*Machine Learning Methods while Safeguarding Privacy*

11:30-12:00        Speaker: Vladyslav Chuchva
Title: *Application Features of Artificial Neural Network Technology of Dielectric Cylinders Discrimination Using Multifrequency Reflectivity Measurements*

12:00-12:30        Speaker: Volodymyr Hnatushenko
Title*: Computer-Aided Diagnosis Models for Breast Cancer Detection Decision Support Systems*

Lunch Break

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14:00-14:45        KEYNOTE TALK

Speaker: Xiaosen  Han
Title*: Existence of Topological Defects in the Georgi-Machacek Model*

14:45-16:15        Session NUMERICAL METHODS

14:45-15:15        Speaker: Alex Fedoseyev
Title*:  Combined Electron and Proton Radiation Effects on Solar Cells for Earth Orbit*

15:15-15:45        Speaker: Ivan Hristov
Title: *Instability of Three-Body Periodic Collisionless Equal-Mass Free-Fall Orbits*

15:45-16:15        Speaker: Nectarios Papanicolaou
Title: *Spreading and Leveling of Finite Thin Films with Elastic Interfaces: An Eigenfunction Expansion Approach*

Break

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16:30-18:30        Session NUMERICAL METHODS

| 16:30-17:00 | Speaker: Zlatinka Kovacheva |
|---|---|
| | Title: *Noise as a Factor of Useful Signal Amplification Based an the Effect of Stochastic Resonance* |

| 17:00-17:30 | Speaker: Krasimir Angelow |
|---|---|
| | Title: *Numerical Study of the classical 1D Boussinesq Equation* |

| 17:30-18:00 | Speaker: Viktoria Gladkova |
|---|---|
| | Title: *Approach to Optimizing and Managing Warehouse Stock in a Car Service* |

| 18:00-18:30 | Speaker: Stoyan Apostolov |
|---|---|
| | Title: *Advanced Monte Carlo Algorithm for Linear System* |

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| 19:00 | Official Dinner - the restaurant of Rai (The Paradise) |
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| | Meeting point in front of the Flamingo Grand hotel |

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## Corella Hall

PARALLEL ZOOM SESSION

Join Morning 2 Zoom Meeting <mark>10:00-16:15</mark>
 https://essex-university.zoom.us/j/92040184669

Hosted by Georgi Grahovski

| 10:00-12:00 | Special Session INTERDISCIPLINARY FRONTIERS OF NONLINEARY SCIENCE |
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| 10:00-10:30 | Speaker: Xiaomin Chen |
|---|---|
| | Title*: Generalized Discrete Lotka-Volterra Equation, OPs and Generalized $\varepsilon$-Algorithm* |

| 10:30-11:00 | Speaker: Yujiao Cui<br>Title*: Periodic Orbits and Bifurcations of Four-Dimensional Non-Autonomous Piecewise Smooth Discontinuous Systems* |
|---|---|
| 11:00-11:30 | Speaker: Ran Sun<br>Title*: The Application of the Melnikov Method in Multi-Steady-State Systems* |
| 11:30-12:00 | Speaker: Xiangyu Tian<br>Title*: Study on Impact Load Mitigation for High-Speed Water Entry Projectiles Using Aluminum Foam Buffering Structure* |

Session SCIENTIFIC COMPUTING

| 12:00-12:30 | Speaker: Dimiter Slavchev<br>Title*: Analysis of Method Based on Repeated BURA for Approximating Matrices on Fractional Power $\alpha > 1$* |
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Lunch Break

| 14:45-16:15 | Session BIOMATHEMATICS |
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| 14:45-15:15 | Speaker: Mikhail Kolev<br>Title*: A New Application of the Kinetic Type Theory in Immunology* |
| 15:15-15:45 | Speaker: Shouming Zhou<br>Title: *The Inviscid Limit for Some Keller-Segel Equations* |

Session E-LEARNING

| 15:45-16:15 | Speaker: Meglena Lazarova<br>Title: *Application of Machine Learning and Artificial Intelligence Techniques To Study Cannabinoid Compounds* |
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| 19:00 | Official Dinner - the restaurant of Rai (The Paradise)<br>Meeting point in front of the Flamingo Grand hotel |
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**TUESDAY, JUNE 25, 2024**

## Flamingo Grand Hall

08:30-09:30      PLENARY TALK

               Speaker: Yunhe Sheng
               Title: *Post-Groups, Post-Groupoids and the Yang-Baxter Equation*

Coffee Break

10:00-11:30      Session MATHEMATICAL PHYSICS AND TRANSPORT PROCESSES

10:00-10:30      Speaker: Wilson Zuniga-Galindo
               Title: *Quantum Mechanics at the Planck Length*

10:30-11:00      Speaker: Daniel Dantchev
               Title: *$\phi^4$ Model under Neumann-Dirichlet Boundary Conditions*

11:00-11:30      Speaker: Bogdan Dimitrov
               Title: *Topological, Differential Geometry Methods and Modified Variational Approach for Calculation of the Propagation Time of a Signal, Emitted by GPS-Satellite and Depending on the Full Set of 6 Keplerian Parameters*

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|---|---|
| 11:30-12:30 | Session NUMERICAL METHODS |
| 11:30-12:00 | Speaker: Shuxia Li<br>Title: *The Newton-Cotes Quadrature Formulas with Error Term* |
| 12:00-12:30 | Speaker: Dobri Dankov<br>Title: *Numerical Modeling of Pulsed Pirani Gauge Dynamics: Non-Constant Filament Temperature Analysis* |

Lunch Break

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|---|---|
| 14:00-16:00 | Session MATHEMATICAL PHYSICS AND TRANSPORT PROCESSES |
| 14:00-14:30 | Speaker: Rossen Ivanov<br>Title: *Internal Waves over Uneven Bottom and Soliton Equations* |
| 14:30-15:00 | Speaker: Vladimir Gedjikov<br>Title: *Riemann-Hilbert Problems and Integrable Equations* |
| 15:00-15:30 | Speaker: Georgi Grahovski<br>Title: *On the N-Wave Hierarchy with Constant Boundary Conditions* |
| 15:30-16:00 | Speaker: Vesselin Vatchev<br>Title: *Power Series Method for Nonlinear Fluid Dynamics Equations* |

Break

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|---|---|
| 16:30-18:30 | Session MATHEMATICAL PHYSICS AND TRANSPORT PROCESSES |

| 16:30-17:00 | Speaker: Vesselin Gueorguiev |
| | Title: *Reparametrization Invariance and Its Relation to the Dark Energy and Dark Matter Phenomen* |

| 17:00-17:30 | Speaker: Abhinandan Chowdhury |
| | Title: *Memory Effects for the Heat Conductivity in a Disordered Two-Phase Media* |

| 17:30-18:00 | Speaker: Tihomir Valchev |
| | Title: *Particular Solutions to a Magnetic Type Nonlinear Evolution Equation* |

| 18:00-18:30 | Speaker: Enrique Reyes |
| | Title: *Integrable Rosenau-Hyman Equations* |

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### Corella Hall

PARALLEL ZOOM SESSION

Join Morning 2 Zoom Meeting 10:00-16:15
https://essex-university.zoom.us/j/92040184669

Hosted by Georgi Grahovski

| 10:00-10:30 | Session E-LEARNING |

| 10:00-10:30 | Speaker: Gleb Haynatzki |
| | Title*: Machine Learning / Artificial Intelligence (ML/AI): Explainable and/or Causal* |

| 10:30-12:00 | Session BIOMATHEMATICS |

| 10:30-11:00 | Speaker: Georgi Boyadzhiev |
| | Title*: New Spatial SEIR Epidemic Models with Low Rate of Infected. Applications and Features* |

11:00-11:30          Speaker:  Ognyan Kounchev
                     Title*: The Covid-19 Pandemic in Bulgaria: Models,
                      Applications, Retrospection, and Lessons Learnt*

11:30-12:00          Speaker:  Liyan Jia
                     Title*: Optimal Design of Intracranial Hematoma Puncture
                     Drainage Tube Based on Adaptive Bifurcation Algorithm*

12:00-12:30          Speaker:  Miroslav Stoenchev
                     Title*: Non-Abelian Divisible Groups*

**WEDNESDAY JUNE 26, 2024**

**FLAMINGO GRAND HALL**

Join Zoom Meeting <mark>08:30-12:00</mark>

https://us02web.zoom.us/j/88536784106?pwd=kccj9or4ugPkLPs1wtRA11JHuH4qrL.1

Meeting ID: 885 3678 4106
Passcode: 521551

Hosted by Michail Todorov

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|---|---|
| 08:30-09:30 | PLENARY TALK: Dengshan Wang |
| | Title: *Miura Transformations and Large-Time Behaviors of Good Boussinesq Equation and Its Modified Versions* |

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09:30-10:00 BREAK
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|---|---|
| 10:00-12:30 | Special Session INTERDISCIPLINARY FRONTIERS OF NONLINEAR SCIENCE |
| 10:00-10:30 | Speaker:  Nuri Ma |
| | Title:*Dynamic Analysis and Optimal Control Strategy of a SEIR-Type Infectious Disease Model with Reinfection and Vaccine Inefficacy* |
| 10:30-11:00 | Speaker: Yuying Chen |
| | Title: *A Distance-Based Microbiome Kernel Association Test with Multi-Categorical Outcomes* |
| 11:00-11:30 | Speaker: Qian Wang |
| | Title: *Design and Realization of Self-Tuned Power Absorber Control System* |
| 11:30-11:45 | RECAPITULATION AND OFFICIAL CLOSING SESSION |

OF THE CONFERENCE

| 11:45-12:00 | *Virtual Trip for the on-line participants* |
| | Guided by Tzvetan Ostromsky |

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| 11:30-12:00 | Good Bye Party for the off-line participants |

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