CONFERENCE PROGRAM
FDM'18
(11 – 16.06. 2018)

Monday, June 11	
9:00 – 19:00	Registration, Hotel Ambelitz

Lecture Hall 1	
9:45 – 10:30	**Opening:** **Deputy Minister at Ministry of Education and Science – Bulgaria** **Prof. I. Dimov**, *Computational Nano-Physics-Monte Carlo Approach*
Chairman:	**K. In't Hout**
10:30 – 11:15	<u>Vladimir Shaydurov</u>, S. Zhang, E. Karepova, *Computational Mean-Field Game for Emission-Permit Trading*
11:15 – 12:00	A. Ern, T. Gudi, I. Smears, <u>Martin Vohralík</u>, *Potential and Flux Reconstructions for Optimal a Priori and a Posteriori Error Estimates*
Lunch break	
Chairman:	**J. Chaskalovic**
13:45 – 14:30	A.Churbanov <u>Petr Vabishchevich</u>, *Numerical Solving a Boundary Value Problem for the Eikonal Equation*
14:30 – 15:15	Natalia Kopteva, *Error Analysis of the L_1 Method on Graded and Uniform Meshes for a Fractional-derivative Problem in a Two and Three dimensions*
15:15 – 16:00	Olivier Lafitte, *Coupling Two Pphysical Problems: Neutronics Equations Coupled with Hydrodynamics Equations*
Coffee break	
Chairman:	**H. Yoshioka**
16:35 – 17:20	<u>J. Chaskalovic</u>, F. Assous, *From a Geometrical Interpretation of Bramble Hilbert Lemma to a Probabilistic Distribution for Finite Elements Accuracy*
17:20 – 18:05	Song-Ping Zhu, *Finite Difference Methods and their applications in pricing American options*
18:05 – 18:50	Maxim Olshansky, *Adaptive FDM for Free –Surface Incompressible Flows*

Tuesday, June 12

9:00 – 19:00	Registration, Hotel Ambelitz

Lecture Hall 1

Chairman:	*P. Vabishchevich*
8:30 – 9:15	J. A. Ferreira, *Supraconvergence and Supercloseness of Schemes for Multiphysics Problems*

Coffee break

9:45 – 10:30	Bruno Despres, *Recent Results In Positivity Preserving Polynomials*

10:30 – 12:10 Special Session: *Finite differences methods in life sciences*
Organized by: G. Pena, J. A. Ferreira

Chairman:	*J.A. Ferreira*
10:30 – 10:55	J. A. Ferreira, P. de Oliveira, <u>Gonçalo Pena,</u> *A Nonuniform Finite Difference Scheme for a Iontophoresis Model*
10:55 – 11:20	<u>Ercilia Sousa,</u> Amal K. Das, *A Fractional Diffusion Model with Resetting*
11:20 – 11:45	J.A. Ferreira, <u>Daniela Jordao,</u> L. Pinto, *Coupling Ultrasound Propagation and Drug Transport: A Second Order Fully Discrete FEM*
11:45 – 12:10	J.A. Ferreira, P. Oliveira, <u>Elisa Silveira,</u> *Temperature Enhanced Drug Delivery System: An Accurate Discrete Model Under Weak Smoothness Assumptions*

Lunch break

Chairman:	*S. Polyakov*
14:15 – 14:40	Viktoriia Podryga, <u>Sergey Polyakov</u> *Multiscale Mathematical Modeling of the Metal Nanoparticles Motion in a Gas Flow*
14:40 – 15:05	<u>Yuri Poveshchenko,</u> V.O. Podryga, P.I. Rahimly, *About Free-Volumetric Approximation of a Piezoconductive Medium with Gas Hydrate Inclusions*
15:05 – 15:30	<u>Igor Popov,</u> Yuri Poveschenko, Sergey V. Polyakov, *Construction of a Higher-order Approximation Difference Scheme for a Nonlinear Convection-Diffusion Equation Using Adaptive Artificial Viscosity with Respect to Two-phase Filtering Problems*
15:30 – 15:55	<u>Parvin Rahimly,</u> Yu.A. Poveshchenko, V.O. Podryga, O.R. Rahimly, *Completely Conservative Difference Schemes for Simultaneous Calculations of Thawed Hydrated Zone and Piezoconductive Medium with Gas Hydrate Inclusions*

Coffee break

Chairman:	*Y. Poveshchenko*
16:30 – 16:55	Yuri N. Karamzin, <u>Sergey Polyakov,</u> Viktoriia O. Podryga, *Finite Difference Schemes on Locally Refined Cartesian Grids for the Solution of Gas Dynamic Problems on the Basis of Quasigasdynamics Equations*
16:55 – 17:20	<u>Yuri Poveshchenko,</u> P.I. Rahimly, I.V. Gasilova, G.V. Kazakevich, Yu.S. Sharova, *Modeling of Fluidodynamic Processes in a Porous Medium with Gashydrate Deposits*
17:20 – 17:45	S.Yu. Guskov, N.V. Zmitrenko, <u>Orkhan Rahimly,</u> *A Converging Shock Wave for Ignition of a Pre-compressed Target of Laser Thermonuclear*

	Fusion
17:45 – 18:10	Yulia. Sharova, Yu.A. Poveshchenko, S.B. Popo, *Integral-Consistent Numerical Technique for Self-Gravitating Medium Model*
18:10 – 18:35	Jun Yu, Kewang Chen, Laura K. Gross, *Asymptotic and Numerical Analyses of Dynamics in a Generalized Free-Interfacial Combustion Model*
18:35 –19:00	Sergey V. Bogomolov, N.B. Esikova, A.E. Kuvshinnikov, P.N. Smirnov, *On Gas Dynamic Hierarchy*

	Lecture Hall 2
10:30 – 12:10	**Special Session:** *Meshfree Generalized Finite Difference Methods: From Theory to Applications* **Organized by: I. Michel, P. Suchde**

Chairman:	**P. Suchde**
10:30 – 10:55	Pratik Suchde, Joerg Kuhnert, *A Meshfree Generalized Finite Difference Method For Surface PDEs*
10:55 – 11:20	Fabian Nick, Bram Metsch and Hans-Joachim Plum, *Algebraic Multigrid Methods for Meshfree and Generalized Finite Difference Methods*
11:20 – 11:45	Oleg Davydov *Stencil Selection for Meshless Finite Difference Methods*
11:45 – 12:10	Csaba Gáspár, *The Method of Fundamental Solutions Combined with a Multi-Level Technique*

	Lunch break

Chairman:	**M. Vohralík,**
14:15 – 14:40	Felix R. Saucedo-Zendejo, Edgar O. Resendiz-Flores, Jörg Kuhnert *Three-dimensional modelling of mould filling processes in casting using a GFDM*
14:40 – 15:05	Anastasia V. Sivtseva, Petr V. Sivtsev, *Numerical Simulation of Stress-Strain State of Basalt Roving*
15:05 – 15:30	S.Chandra Sekhara Rao, Sheetal Chaw, *The Error Analysis of Finite Difference Approximation for a System of Semilinear Reaction-diffusion Problems with Discontinuous Source Term*
15:30 – 15:55	A.V. Avvakumov, V.F. Strizhov, P.N. Vabishchevich, Alexandr Vasilev, *Automatic Time Step Selection for Numerical Solution of Neutron Diffusion Problems*

	Coffee break

Chairman:	**J. Geiser**
16:30 – 16:55	Andrey Gusev, O. Mazhorova, O. Shcheritsa, *Mathematical Modeling of Phase Transitions in Multicomponent Alloys*
16:55 – 17:20	Andreas Langer, *Convergent Domain Decomposition Methods for Total Variation Minimization*
17:20 – 17:45	Nadezhda Fialko, V.D. Lakhno, *On the Modeling of the Charge Transfer along DNA at T=300K*
17:45 – 18:10	Natalia Yaparova, *Numerical Method for Calculating the Pipe Spatial Vibrations*
18:10 – 18:35	Vladimir Vasilyev, *On Digital Pseudo-dfferential Operators and Equations*
18:35 – 19:00	Aigul Manapova , *On Convergence of Difference Schemes for Nonlinear Elliptic Equations with Unbounded Nonlinearity*

20:30	**Welcome party** (Hotel Ambelitz)

Wednesday, June 13

9:00 – 19:00	Registration, Hotel Ambelitz

Lecture Hall 1

Chairman:	*V. Shaydurov*
8:30 – 9:15	Stéphane Bordas, *Free Boundary Problems: Challenges and Opportunities for Adaptive Collocation Schemes*
9:15 – 10:00	<u>Hidekazu Yoshioka</u>, Yuta Yaegashi, *Finite Difference Scheme for Stochastic Differential Games with Several Singular Control Variables and its Environmental Application*

Coffee break

Poster session during the coffee break

<u>Hidekazu Yoshioka</u>, Kentaro Tsugihashi, Yuta Yaegashi, *Finite Difference Computation of a Stochastic Aquaculture Problem under Incomplete Information*

Zorica Milovanovic*, One Class of Contour Problems with Nonlocal Integral Conjugation Conditions*

<u>Felix Bernardo</u>, Claudio Cuevas, *Bounded Solutions of Volterra Functional Difference Equations*

10:30 – 17:25 Special Session: *Iterative schemes for solving nonlinear models*
Organized by: M.P.Vassileva,A.Cordero,J.R.Torregrosa

Chairman:	*A. Cordero*
10:30 – 10:55	Alicia Cordero, Ivan Gimenez, <u>Juan R. Torregrosa</u>, *Efficiency and Stability of a Family of Iterative Schemes for Solving Nonlinear Equations*
10:55 – 11:20	<u>Javier G. Maimo</u>, Maria P. Vassileva, *Dynamical Study of a New Bi-parametric Family of Methods With Memory*
11:20 – 11:45	<u>Alicia Cordero</u>, Juan R. Torregrosa, Maria P. Vassileva, *Multidimensional Real Dynamics for High-Order Processes*
11:45 – 12:10	<u>Fiza Zafar</u>, Alicia Cordero, Juan R. Torregrosa, *On a Family of Optimal Eighth order Multiple Root Finders with Multivariate Weight Function*
12:10 – 12:35	<u>Maria P. Vassileva</u>, Javier G. Maimo, *Bi-parametric Family of Methods with Memory Based of Ostrowski-Chun Method*

Lunch break

Chairman:	*J. Torregrosa*
14:15 – 14:40	Alicia Cordero, <u>Lucia Guasp</u>, Juan R. Torregrosa, *Stability of a Family of Iterative Methods of Fourth-order*
14:40 – 15:05	Ramandeep Behl, <u>Eulalia Martınez</u>, Ali Saleh Alshomrani, *An Optimal Eighth-order Scheme for Multiple Roots Applied to Some Real Life Problems*
15:05 – 15:30	<u>Alexandru-Mihai Bica</u>, Mircea Curila, Sorin Curila, *Spline Iterative Method for Pantograph Type Functional Differential Equations*
15:30 – 15:55	Solodushkin S.I. and <u>Irina Iumanova</u>, *The Third Order Iterative Method for Solving Nonlinear Parabolic Equations and its Application to the Heart Models*

Coffee break	
Chairman:	*M. Stehlik*
16:35 – 17:20	Jurgen Geiser, *Recent Advances in Iterative Splitting Methods for Multicomponent and Multiscale Problems: Theory and Applications*
17:20 – 17:45	Alex Timonov, *Iterative Algorithms For Coupled Physics Electrical Conductivity Imaging*
17:45 – 18:10	Irina Zakharova, A. Kalinovich, M. Komissarova, S. Sazonov, *Multi-step Iterative Algorithm for Mathematical Modeling of Light Bullets in Anisotropic Media*

Lecture Hall 2	
Chairman:	*S. Bordas*
10:30 – 11:15	Milan Stehlik, *Modeling of Cancer Risk*
11:15 – 11:40	Pavlina Jordanova and Milan Stehlik, *P-thinned Gamma process and corresponding random walk.*
11:40 – 12:05	Alexander S. Sipin, Alexander I. Zeifma, *Numerical Experiments For Some Markov Models For Solving Boundary Value Problems*
12:05 – 12:30	Wojciech Kempa, *Time to Start a Crowded Period in a Finite-buffer Queue with Poisson Input Flow and General Processing Times*

Lunch break	
14:15 – 17:00	**Special Session: *Advanced numerical and applied studies of inverse problems*** **Organized by: S. Kabanikhin, M. Shishlenin**
Chairman:	*M. Shishlenin*
14:15 – 14:40	Sergey Kabanikhin, M.A. Shishlenin, *Numerical Methods for Solving Inverse and Ill-posed problems of Mathematical Physics*
14:40 – 15:05	D.V. Lukyanenko, V.T. Volkov, M.A. Shishlenin, *Solving of the Coefficient Inverse Problem for a Nonlinear Reaction-Diffusion Equation with the Location of the Moving Front Data*
15:05 – 15:30	Alexey Penenko, V.V. Penenko, E.A. Tsvetova, Z.S. Mukatova, *Consistent Discrete-Analytical Schemes for the Solution of the Inverse Source Problems for Atmospheric Chemistry Models with Image-Type Measurement Data*
15:30 – 15:55	Dulus Ivanov, P. N. Vabishchevich, *Iterative Process for Numerical Recovering The Lowest Order Space-Wise Coefficient in Parabolic Equations*

Coffee break	
Chairman:	*O. Lafitte*
16:35 – 17:00	Maxim Shishlenin, N.S. Novikov, *Numerical Simulation of the Two-dimensional Acoustic Tomography*
17:00 – 17:25	Seungil Kim, *Error Analysis of a PML-FEM Approximation for the Helmholtz Equation in Waveguides*
17:25 – 17:50	T.V. Gorbova, V.G. Pimenov, S.I. Solodushkin, *Difference Schemes for the Nonlinear Equations in Partial Derivatives with Heredity*
17:50 – 18:15	Liudmila Prokudina, *Nonlinear differential equation of the surface section of gas-liquid*
18:15 – 18:40	Baver Okutmustur, *Analysis of Burgers Model on Reisnerr-Nordström Spacetime by Finite Volume Approximations*

Poster session:	
18:40-19:00	Alexander Vyatkin, Elena Kuchunova, *Numerical Method of Navier-*

Stokes Equations for Multicomponent Air Motion Modeling

Mikhail Kolev, Ana Markovska, *On a Numerical Analysis of the Interactions Between viral Infection and Immune System*

Anelia Urumova, Boyko Kolev, Mikhail Kolev, Mathematical modelling of environmental components

Iveta Nikolova, *M. Kolev, Autoimmune diseases: mathematical modelling and computer simulations*

Irina Naskinova, M. Kolev, *On a computational study of growth of microorganisms*

Thursday, June 14

Lecture Hall 1

Chairman:	*N. Kopteva*
8:30 – 9:15	Grigorii Shishkin, *Improved Computer Scheme for a Singular Perturbed Parabolic Convection-Diffusion Equation*

Lecture Hall 1

9:15 – 12:05	**Special Session:** *Novel Methods in Computational Finance* **Organized by: M. Ehrhardt, C. Mishra, S. Wang**
Chairman:	*S. Wang*
9:15 – 10:00	Karel in 't Hout, *ADI Schemes For Valuing European Options Under The Bates Model*
10:00 – 10:30	**Coffee break**
10:30 – 11:15	Christian Hendricks, Matthias Ehrhardt, Michael Günther, *High-Order Methods For Parabolic Equations in Multiple Space Dimensions For Option Pricing Problems*
11:15 – 11:40	Vitaly Kamynin, Tatiana Bukharova, *On Inverse Problem of Determination of the Coefficient in the Black-Scholes Type Equation*
11:40 – 12:05	Mani Mehra, Kuldip Singh Patel, *High-Order Compact Finite Difference Method For Time Fractional Black-Scholes Partial-Differential Equation*
12:05 – 12:30	M. Novikov, V. Lisitsa, Tatiana Khachkova, *Numerical Estimation of Seismic Wave Attenuation in Fractured Porous Fluid-saturated Media*

Lunch break

Chairman:	*I. Farago*
14:00 – 14:45	Zahari Zlatev, Ivan Dimov, Istvan Farago, Krassimir Georgiev, Agnes Havasi, *Stability Properties of Repeated Richardson Extrapolation Applied together with some Implicit Runge-Kutta Methods*
14:45 – 15:30	Istvan Farago, *Qualitative Properties of Discrete Mesh Operators and Their Relations*
15:30 – 18:00	**Special Session:** *Numerical methods for propagation processes* **Organized by: Petra Csomós and István Faragó**
15:30 – 15:55	Zahari Zlatev, I. Dimov, I. Farago, K. Georgiev, A. Havasi,, *Implementation of the Two-times Repeated Richardson Extrapolation together with Explicit Runge-Kutta Methods*

Coffee break

Chairman:	*Z. Zlatev*
16:20 – 16:45	Sidafa Conde, <u>Imre Fekete</u>, John N. Shadid, *Embedded Error Estimation and Adaptive Step-Size Control for Optimal Explicit Strong Stability Preserving Runge-Kutta Methods*
16:45 – 17:10	M. Mincsovics, *Discrete C^1 Convergence of Linear Multistep Methods*
17:10 – 17:35	<u>B. Takacs</u>, R. Horvath, I. Farago, *A Two Dimensional Model for the Ecological Collapse of Easter Island*
17:35 – 18:00	Petra Csomós, *Innovative Integrators for Optimal Control of Shallow Water Equations*
18:00 – 18:25	<u>Abdujabar Rasulov</u>, Raimova G.M., Baqoev M.T., *Monte Carlo Solution of Dirichlet Problem for Helmholtz Equation with a Polynomial Nonlinearity*
18:25 – 18:50	G.V. Reshetova, <u>Tatiana Khachkova</u>, *Parallel Numerical Method to Estimate the Effective Elastic Moduli of Rock Core Samples from 3D Tomographic Images*

Lecture Hall 2

11:15 – 15:50	**Special Session:** *Reliable difference methods for Singularly Perturbed Problems* **Organized by: G. Shishkin, L. Shishkina**

Chairman:	*G. Shishkin*
11:15 – 11:40	Lidia Shishkina, *Development and Numerical Study of Robust Difference Schemes for a Singularly Perturbed Transport Equation*
11:40 – 12:05	<u>Ilhame Amirali</u>, Gabil M. Amiraliyev, *Numerical Method for Parameterized Singularly Perturbed Problem Containing Integral Boundary Condition*
12:05 – 12:30	<u>Irina Tselishcheva</u>, Grigorii Shishkin, *On a Reliable Numerical Method for a Singularly Perturbed Parabolic Reaction-Dffusion Problem in a Doubly Connected Domain*
12:30 – 12:55	Vasiliy Kachalov, *Analytic Theory of Singular Perturbations and the Regularization Method of SA Lomov*

Lunch break

Chairman:	*L. Shishkina*
15:05 – 15:30	<u>Joginder Singh</u>, Sunil Kumar, Mukesh Kuma, *A High Order Accurate Overlapping Domain Decomposition Method for Singularly Perturbed Reaction-Diffusion Systems*
15:30 – 15:55	Svetlana Tikhovskaya, *Solving a Singularly Perturbed Elliptic Problem by a Cascadic Multigrid Algorithm with Richardson Extrapolation*

Coffee break

16:20 – 18:00	**Special Session:** *Asymptotic Analysis for Numerical Methods for Problems with Sharp Transition Layers* **Organized by: N. Nefedov**
Chairman:	*N. Nefedov*
16:20 – 16:45	Nikolay Nefedov, *Blowing-up of Fronts in Reaction-Diffusion-Advection Problems*
16:45 – 17:10	<u>Vladimir Volkov</u>, D.V. Lukyanenko, *Asymptotic-Numerical Method for the Description of Moving Fronts in Nonlinear Two-imensional Reaction-Diffusion Models*
17:10– 17:35	<u>Marina Davydova</u>, N.N. Nefedov, S.A. Zakharova, *On a Stable Solutions of the Some Nonlinear Singularly Perturbed Problems of the*

17:35 – 18:00	*Heat and Mass Transfer* Alina A. Melnikova, Natalia N. Deryugina, *The Problem of the Front Motion to a Nonlinear System of Equations*
18:00 – 18:25	Vyacheslav A. Trofimov, <u>Evgeny Trykin</u>, *Explicit and Conditionally Stable Combined Numerical Method for 1D and 2D Nonlinear Schrödinger Equation*

Poster session: 18:25-18:50	
	Zhanat Dzhobulaeva, *The Estimates of the Solution of the Nonregular Problem for the Parabolic Equations with Two Small Parameters in the Boundary Conditions*
	Alexander Zadorin, *Analogue of Cubic Spline for Functions With Large Gradients in a Boundary Layer*
	Maria Ivanchuk, Igor Malyk, <u>Tetiana Knihnitska</u>, Pavlo Ivanchuk, *An Example of Markov Chains Application in Medicine*

Friday, June 15

Lecture Hall 1

8:30 – 12:35	**Special Session: *Numerical methods for fractional derivative problems and applications*** **Organized by: A. Alikhanov, R. Lazarov, M. Stynes**

Chairman:	*S.-P. Zhu*
8:30 – 9:15	Song Wang, *Numerical Solution of Fractional ODEs and Optimal Control Problems*
9:15 – 10:00	Martin Stynes, *A Second-Order Method On Graded Meshes For A Time-Fractional Diffusion Problem*

Coffee break

Chairman:	*M. Stynes*
10:30 – 10:55	Anatoly A. Alikhanov, *A difference analogue of the higher order approximation for Caputo fractional derivative and its application for solving the time-fractional diffusion equation*
10:55 – 11:20	<u>Monzorul Khan</u>, Yubin Yan, *The spectral method for solving stochastic space-fractional partial differential equation*
11:20 – 11:45	<u>Valentin Alekseev</u>, Tyrylgin A.A., Vasilyeva M.V, *Generalized Multiscale Finite Element Method for Elasticity Problem in Fractured Media*
11:45 – 12:10	<u>Denis Spiridonov</u>, Vasilyeva M.V., *A Generalized Multiscale Finite Element Method for Modeling Unsaturated Filtration in Fractured Media*
12:10 – 12:35	<u>Maria Vasilyeva</u>, Eric T. Chung, Yalchin Efendiev, Wing Tat Leung, Yating Wang, *Upscaled Model For Mixed Dimensional Coupled Flow Problem In Fractured Porous Media Using Non-Local Multi-Continuum (NLMC) Method*
12:35 – 13:00	<u>Uygulaana Gavrilieva</u>, Alekseev V.N., Vasilyeva M.V., *Generalized Multiscale Discontinuous Galerkin Method for Helmholtz Problem in Fractured Porous Media*

Lecture Hall 2

Chairman:	M. Ehrhardt
10:30 – 10:55	*Lucila Helena Allan Leskow, Codes Generation Based on Hyperbolic Tessellations*
10:55 – 11:20	Lidiya V. Gileva, <u>Evgeniya D. Karepova</u>, Vladimir V., Shaidurov, *The Application of Hermite Finite Elements to the Solution of the Helmholtz Equation*
11:20 – 11:45	<u>Valentin Gushchin</u>, Vasilii G. Kondakov, *On One Method for Solving of a Non-stationary Fuid Fows with Free Surface*
11:45 – 12:10	<u>Aleksei Tyrylgin</u>, Brown D, Vasilyeva M.V., *Generalized Multiscale Finite Element Method for Poroelasticity Problems in Heterogeneous Media*
12:10 – 12:35	<u>Tatiana Akimenko</u>, E. Filippova, *Computer Modeling of Diagnostics of Thermal Imaging Devices*

14:00	**Excursion**
20:00	**Official Dinner (Hotel Ambelitz)**

Saturday, June 16

Lecture Hall 1

Chairman:	V. Shaidurov
8:00 – 9:25	<u>Mikhail Filimonov</u>, N, Vaganova, *Simulation of Influence of Special Regimes of Horizontal Flare Systems on Permafrost*
9:25 – 9:50	Oleg Shatrov, O. Shcheritsa, O. Mazhorova, *Problem of Planform Selection in an Internally Heated Fluid Layer*
9:50 –10:15	<u>NataliiaVaganova,</u> M. Filimonov, *Simulation of Cooling Devices and the Effect for Thermal Stabilization Solil in a Cryolithozone with Anthropogenic Impact*
10:15 –10:40	Vasil'ev, A.M. <u>Anatol Kardashevsky</u>, V.V. Popov, *The Conjugate Gradient method for the Dirichlet Problem and its Modifications*

10:40 – 10:50	Closing

Departure