



Online Workshop

Mathematical modelling in biomedicine

October 25-29, 2021 (Moscow time zone, GMT+3)

October 25

9.45-10.00 Opening

Plenary lecture: (Chairman: V. Volpert)

10.00-10.40: G. Bocharov Mathematical immunology: emerging challenges and novel approaches

Session: Viral infection and immune response (Chairman: V. Volpert)

10.45-11.15	J. Moore	<i>Antigen Transport and Information Delivery through the Lymphatic System</i>
11.20-11.50	A. Bouchnita	<i>Seroprevalence modulates key epidemiological characteristics in COVID-19</i>
11.55-12.25	R. Savinkov	<i>Modeling individual cellular dynamics using cellular automata and artificial neural networks</i>
12.30-13.00	C. Leon	<i>Modelling of the innate and adaptive immune responses to SARS viral infection</i>

13.00-14.00 Break

Plenary lecture: (Chairmen: A. Sequeira, S. Simakov)

14.00-14.40: Yu. Vassilevksi Personalized computational 3D hemodynamics and clinical applications

Session: Cardiovascular system (Chairmen: A. Sequeira, S. Simakov)

14.45-15.15	I. Chernyavsky	<i>Structural determinants of function in complex microvascular tissues</i>
15.20-15.50	G. Abi Younes	<i>Mathematical modeling of inflammatory processes of atherosclerosis</i>
15.55-16.15	J. Garay	<i>Parameter estimation in fluid flow models from aliased velocity measurements</i>
16.20-16.40	C. Carcamo	<i>Error analysis of pressure reconstruction from discrete velocities</i>
16.45-17.05	J. Aguayo	<i>An inverse method for obstacle identification in Navier-Stokes flow using a permeability term</i>

October 26

Plenary lecture: (Chairman: A. Bratus)

10.00-10.40: A. Chupakhin Energy functionals in the hydroelastic system of a fusiform aneurysm

Session: Cancer modelling (Chairman: A. Bratus)

10.45-11.15	M. Kuznetsov	<i>Combined influence of nutrient availability and tissue mechanical properties on non-invasive tumor growth as revealed by mathematical modeling</i>
11.20-11.50	K. Wertheim	<i>The first multi-cellular model of neuroblastoma</i>
11.55-12.25	R. Aboulaich	<i>Tumor growth simulation using partial differential equations and agent-based modeling</i>
12.30-13.00	A. Stephanou	<i>Mathematical modelling of cancer cells metabolism</i>

13.00-14.00 Break

Plenary lecture: (Chairmen: A. Panfilov, A. Tsaturyan)

14.00-14.40: A. Tsaturyan Structural biology of muscle contraction: experiments and mathematical modeling

Session: Cardiac modelling (Chairmen: A. Panfilov, A. Tsaturyan)

14.45-15.15	F. Syomin	<i>Mathematical model of myocardium electromechanics: simulation of the force response to changes in stimulation frequency and muscle length</i>
15.20-15.50	A. Okenov	<i>Reconstruction the region of fibrosis based on LAT and ECG</i>
15.55-16.25	P. Konovalov	<i>Wave rotation around an infarction scar at presence of gray zone (study on 2D model of the cardiac tissue)</i>
16.30-17.00	D. Mangileva	<i>Factors determining the period of cardiac arrhythmias in an anatomical model of the human heart with myocardial infarction</i>
17.05-17.35	A. Fraguera Collar	<i>Some mathematical models of the mechanical and electrical activity of the heart: forward and inverse problems</i>
17.40-18.10	R. Arostica	<i>On Chorin-Temam schemes for the incompressible Navier Stokes equations in moving domains and its application to left ventricular FSI</i>

October 27

Plenary lecture: (Chairman: G. Bocharov)

- 10.00-10.40: M. Adimy Modeling the relationship between antibody-dependent enhancement and disease severity in dengue infection

Session: Viral infections and epidemics (Chairman: G. Bocharov)

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| 10.45-11.15 | M. Banerjee | <i>Disease progression in a two-group epidemic model: model validation with COVID-19 epidemic</i> |
| 11.20-11.50 | K. Allali | <i>Global analysis of a multi-strain SEIR epidemic model with general incidence functions: application to COVID-19 disease</i> |
| 11.55-12.25 | M. Khristichenko | <i>Optimal disturbances of periodic solutions of viral infections models</i> |
| 12.30-13.00 | D. Grebennikov | <i>Mathematical modeling of intracellular life cycle of HIV-1 and SARS-CoV-2</i> |

13.00-14.00 Break

Plenary lecture: (Chairmen: Yu. Vassilevski)

- 14.00-14.40: A. Sequeira Progress in the description of near-wall transport and hemodynamic parameters in cerebral aneurysms

Session: Blood flow and coagulation (Chairmen: Yu. Vassilevski)

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| 14.45-15.15 | S. Simakov | <i>Computational evaluation of the effectiveness of coronary revascularization</i> |
| 15.20-15.50 | A. Belyaev | <i>Mechano-biology of von Willebrand factor: multiscale computer simulations</i> |
| 15.55-16.25 | A. Masalceva | <i>Initial wall shear rate may determine microvascular thrombus occlusion scenario</i> |
| 16.30-17.00 | E. Bershadsky | <i>In silico analysis of platelet aggregates embolization under arterial shear using particle-based model</i> |
| 17.05-17.35 | T. Salikhova | <i>Modeling of shear-induced platelet activation in patient-specific arteriovenous fistula for hemodialysis</i> |

October 28

Plenary lecture: (Chairman: A. Tokarev)

10.00-10.40: D. Fedosov Intricate journey of micro- and nano-carriers for drug delivery in the blood stream

Session: Blood coagulation and molecular mechanisms (Chairman: A. Tokarev)

10.45-11.15	A. Shibeko	<i>In silico model of composite thrombus dissolution</i>
11.20-11.50	A. Mozokhina	<i>Blood clotting due to thromboinflammation in the lungs decreases the pulmonary circulation</i>
11.55-12.25	A. Megalinsky	<i>Initiation of coagulation reactions under the arterial flow is supported by the immobilized phospholipids</i>
12.30-13.00	I. Eltsov	<i>Brownian dynamics simulation of temperature-dependent assembly and disassembly of tubulin microtubules</i>

13.00-14.00 Break

Plenary lecture: (Chairman: M. Adimy)

14.00-14.40: L. Pujo-Menjouet Neuron scale modeling of prion production with the unfolded protein response

Session: Infectious diseases and clinical trials (Chairman: M. Adimy)

14.45-15.15	A. d'Onofrio	<i>Mathematical Physics of Vaccinations: the interplay behavior-information-space when the disease is absent in the target population</i>
15.20-15.50	D. Neverova	<i>Mathematical modelling of immunnodominance</i>
15.55-16.25	K. Zhudenkov	<i>Modeling continuous longitudinal biomarkers and events in the analysis and prediction of clinical trial outcomes</i>
16.30-17.00	V. Volpert	<i>Viral infection spreading in cell culture</i>

October 29

Plenary lectures: (Chairman: V. Volpert)

10.00-10.40: G. Panasenko Diffusion equation with Dirac-like potential: model of a periodic set of small cells in a nutrient

Session: Nonlinear dynamics (Chairman: V. Volpert)

10.45-11.15	A. Ducrot	<i>Threshold effects for a one-dimensional bistable equation with diffusion</i>
11.20-11.50	S. Petrovskii	<i>Long transients in population dynamics</i>
11.55-12.25	E. Crooks	<i>Travelling waves and minimality exchange in smectic C* liquid crystals</i>
12.30-13.00	B. Ambrosio	<i>Complex Networks and Dynamical Systems: a few Mathematical Perspectives with Applications to Neuroscience</i>

13.00-14.00 Break

Plenary lecture: (Chairman: L. Pujo-Menjouet)

14.00-14.40: J. Clairambault From mathematical modelling of cancer cell plasticity to philosophy of cancer

Session:

14.45-15.15	A. Bratus	<i>Mathematical model of pancreatic cancer</i>
15.15-15.30	Closing	<i>Journal announcements</i>