



XLVII INTERNATIONAL SUMMER SCHOOL  
CONFERENCE ADVANCED PROBLEMS  
IN MECHANICS

Dedicated to the 120th anniversary  
of Peter the Great St. Petersburg Polytechnic University

# PROGRAMME

St. Petersburg 2019

120



ПОЛИТЕХ



Institute of Problems in Mechanics Engineering



FASO Russia  
FEDERAL AGENCY  
FOR SCIENTIFIC ORGANIZATIONS



MINISTRY OF EDUCATION AND SCIENCE  
OF THE RUSSIAN FEDERATION



XLVII INTERNATIONAL  
SUMMER SCHOOL – CONFERENCE  
ADVANCED PROBLEMS IN MECHANICS

JUNE 24–29, 2019,  
ST. PETERSBURG, RUSSIA

APM 2019 PROGRAMME



<http://apm-conf.spb.ru>



**POLYTECH**  
Peter the Great  
St. Petersburg Polytechnic  
University



*Russian Academy of Sciences*





The Conference is organized by the Institute of Problems in Mechanical Engineering of the Russian Academy of Sciences (IPME RAS) and Peter the Great St. Petersburg Polytechnic University (SPbPU) under the patronage of the Russian Academy of Sciences (RAS) and the Ministry of Education and Science of Russian Federation. APM 2019 is partially supported by the Russian Foundation for Basic Research, the Ministry for Science and Education, Gazpromneft.

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PRACTICAL INFORMATION  
(LOCATION, MAPS, ADDRESSES, SCHEDULE TABLE)  
IS AT THE END OF THE BOOK

## General Information

The International Conference “**Advanced Problems in Mechanics 2019**” is the forty seventh in a series of annual summer schools held by Russian Academy of Sciences. The Conference is organized in commemoration of its founder, Ya.G. Panovko by the Institute for Problems in Mechanical Engineering of the Russian Academy of Sciences (IPME RAS), Peter the Great St. Petersburg Polytechnic University (Institute of Applied Mathematics and Mechanics), Scientific Council on Solid Mechanics (RAS) (chairman N.F. Morozov), Russian National Committee on Theoretical and Applied Mechanics (chairman I.G. Goryacheva) under the patronage of the Russian Academy of Sciences (RAS).

The list of problems under investigation is not limited to questions of mechanical engineering, but includes practically all advanced problems in mechanics, which is reflected in the name of the conference. The main attention is given to problems on the boundary between mechanics and other research areas, which stimulates the investigation in such domains as micro- and nanomechanics, material science, physics of solid states, molecular physics, astrophysics and many others. The conference “Advanced Problems in Mechanics” helps us to maintain the existing contacts and to establish new ones between foreign and Russian scientists.

**Young scientists’ school-conference “Modern Ways in Mechanics” (MWM)**, which is held in the frame of the annual international conference “Advanced Problems in Mechanics” (APM), is meant for broadening scientific outlook of young researchers in the field of mechanics and also for organizing their scientific dialogue. It is supposed that students, PhD students and young PhD’s under 30 (date of birth is later than 12/31/1988) from different all over the world, specializing in the sphere of theoretical and applied mechanics become the main participants of the conference. One of the major purposes of conference is transfer of scientific experience from well-known scientists to their young colleagues.

During years 1996–2006, Professor Vladimir A. Palmov co-chaired the School-Conference. He had supervised several generations of mechanicians of St. Petersburg. His scientific insight, questions and remarks, brilliant sense of humour and gentle way to treat young researchers greatly contributed to the atmosphere of APM. To our deep sorrow, Prof. Palmov deceased in October 2018. We will remember him and continue the scientific tradition established by him.

## History of the School

The first Summer School was organized by Ya.G. Panovko and his colleagues in 1971. In the early years the main focus of the School was on nonlinear oscillations of mechanical systems with a finite number of degrees of freedom. The School specialized in this way because at that time in Russia (USSR) there were held regular National Meetings on Theoretical and Applied Mechanics, and there existed many conferences on mechanics with a more particular specialization. After 1985 many conferences and schools on mechanics in Russia were terminated due to financial problems. In 1994 the Institute for Problems in Mechanical Engineering of the Russian Academy of Sciences restarted the Summer School. The traditional name of “Summer School” has been kept, but the topics covered by the School have been much widened. The School



has been transformed into an international conference. The topics of the conference cover now all fields of mechanics and associated into interdisciplinary problems.

## Scientific Committee

- D.A. Indeitsev (IPME RAS, Peter the Great St. Petersburg Polytechnic University, Russia) — Co-Chairman
- A.M. Krivtsov (Peter the Great St. Petersburg Polytechnic University, IPME RAS, Russia) — Co-Chairman
- P.A. Dyatlova (Peter the Great St. Petersburg Polytechnic University, IPME RAS, Russia) — Scientific secretary
- H. Altenbach, Otto-von-Guericke University Magdeburg, Germany
- V.A. Babeshko, Southern Scientific Center RAS, Rostov-on-Don, Russia
- A.K. Belyaev, IPME RAS, Peter the Great St. Petersburg Polytechnic University, Russia
- I.E. Berinskii, Tel Aviv University, Israel
- I.I. Blekhman, IPME RAS, Mekhanobr-Tekhnika, St. Petersburg, Russia
- V.A. Bratov, IPME RAS, St. Petersburg, Russia
- A.A. Burenin, Institute of Metallurgy and Mechanical Engineering Far-Eastern Branch of RAS, Komsomolsk-na-Amure, Russia
- A.V. Cherkaev, University of Utah, Salt Lake City, USA
- F. Dell'Isola, Università di Roma La Sapienza and MEMOCS centre, Italy
- V.A. Eremeyev, Rzeszow University of Technology, Poland
- V.I. Erofeev, Mechanical Engineering Research Institute of RAS or MERI RAS, Russia
- A.B. Freidin, IPME RAS, Peter the Great St. Petersburg Polytechnic University, Russia
- M.E. Frolov, Peter the Great St. Petersburg Polytechnic University, Russia
- S.N. Gavrilov, IPME RAS, St. Petersburg, Russia
- I.G. Goryacheva, Institute for Problems in Mechanics RAS, Moscow, Russia
- E.F. Grekova, IPME RAS, St. Petersburg, Russia; University of Seville, Spain
- N. Gupta, Indian Institute of Technology Delhi, India
- H. Irschik, Johannes Kepler University of Linz, Austria
- M.L. Kachanov, Tufts University, Medford, USA
- B.L. Karihaloo, Cardiff University, UK
- V.A. Kuzkin, Peter the Great St. Petersburg Polytechnic University, IPME RAS, Russia
- V.A. Levin, Lomonosov Moscow State University, Russia
- A.M. Linkov, IPME RAS, Russia; Rzeszow University of Technology, Poland
- I.I. Lipatov, Moscow Institute of Physics and Technology, Russia
- O.S. Loboda, Peter the Great St. Petersburg Polytechnic University, IPME RAS, Russia
- E.V. Lomakin, Lomonosov Moscow State University, Russia
- G. Mishuris, Aberystwyth University, UK
- N.F. Morozov, St. Petersburg State University, IPME RAS, Russia

- W.H. Müller, Technical University of Berlin, Germany
- U. Nackenhorst, Leibniz University of Hannover, Germany
- V.A. Palmov, Peter the Great St. Petersburg Polytechnic University, IPME RAS, Russia
- E. Pavlovskaya, University of Aberdeen, UK
- S.V. Petinov, IPME RAS, Peter the Great St. Petersburg Polytechnic University, Russia
- Y.V. Petrov, St. Petersburg State University, IPME RAS, Russia
- A.V. Porubov, IPME RAS, Saint Petersburg, Russia
- J.-N. Roux, Université Paris-Est, Laboratoire Navier, France
- M.B. Rubin, Israel Institute of Technology, Haifa, Israel
- A.I. Rudskoy, Peter the Great St. Petersburg Polytechnic University, Russia
- S. Rudykh, University of Wisconsin-Madison, USA
- S.H. Sargsyan, Gyumri State Pedagogical Institute, Armenia
- V.V. Sergeev, Peter the Great St. Petersburg Polytechnic University, Russia
- I. Sevostianov, New Mexico State University, USA
- M. Wiercigroch, Aberdeen University, Scotland
- H.A. Wu, University of Science and Technology of China, Chinese Academy of Sciences
- P. Venkitanarayanan, Indian Institute of Technology, India
- E.N. Vilchevskaya, IPME RAS, Peter the Great St. Petersburg Polytechnic University, Russia
- M.V. Zakrzhevsky, Riga Technical University, Latvia

## Local Organizing Committee

- Polina Dyatlova (Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia)
- Anna Kuznetsova (Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia)
- Mikhail Babenkov (Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia)
- Anna Morozova (Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia)
- Mariia Fomicheva (Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia)

The conference is organized with help of our **service agency “Monomax PCO”**:  
[www.monomax.ru](http://www.monomax.ru)

# Scientific Programme

Presentations devoted to fundamental aspects, or widening the field of applications of mechanics, are invited. We are particularly keen to receive contributions that show new effects and phenomena or develop new mathematical models. The topics of the conference cover all fields of mechanics, including, but not restricted, to

- complex media: micropolar theory, chemomechanics, biomechanics, acoustic metamaterials etc.
- nano-, micro- and mesomechanics
- phase transitions and nonlinear elasticity
- plasticity
- solids and structures
- wave motion
- computational mechanics
- mechanical and civil engineering applications
- geomechanics
- problems of the oil and gas sector
- fluid and gas
- aerospace mechanics
- nonlinear and multibody dynamics, chaos and vibration

The Summer School — Conference has two main purposes: to gather specialists from different branches of mechanics to provide a platform for cross-fertilization of ideas, and to give the young scientists a possibility to learn from their colleagues and to present their work. Thus the Scientific Committee encouraged the participation of young researchers, and did its best to gather at the conference leading scientists belonging to various scientific schools of the world.

We believe that the significance of Mechanics as of fundamental and applied science should much increase in the eyes of the world scientific community, and we hope that APM conference makes its contribution into this process.

We are happy to express our sincere gratitude for the help in organization to the Russian Foundation for Basic Research, the Russian Academy of Sciences (RAS), the Ministry of education and science of the Russian Federation. This support has helped substantially to organize the conference and to increase the participation of young researchers.

## Minisymposia

MS1 “Minisymposium on biomechanics”

Organizer: **Olga S. Loboda** (Peter the Great St. Petersburg Polytechnic University, IPME RAS, Russia)

MS2 “Advances in micromechanics of materials”

Organizers: **Igor Sevostianov** (New Mexico State University, USA), **Elena N. Vilchevskaya** (IPME RAS, Peter the Great St. Petersburg Polytechnic University, Russia)

MS3 “Extreme loading on structures”

Organizers: **Nikita F. Morozov** (St. Petersburg State University, IPME RAS, Russia), **Vladimir A. Bratov** (IPME RAS, Russia), **Danila Prikazchikov** (Keele University, UK)

MS4 “Mechanics of Architected Materials”

Organizers: **Igor Berinskii** (Tel Aviv University, Israel), **Stephan Rudykh** (University of Wisconsin-Madison, USA)

MS5 “Granular materials and grain-fluid mixtures”

Organizer: **Jean-Noël Roux** (Université Paris-Est, Laboratoire Navier, Paris, France)

MS6 “New developments in generalized continua — theories and experiments”

Organizers: **Wolfgang H. Müller** (Technical University of Berlin, Germany), **Francesco Dell’Isola** (Università di Roma La Sapienza and MEMOCS centre, Italy)

MS7 “Mechanics and design of materials”

Organizer: **Hengan Wu** (University of Science and Technology of China, Chinese Academy of Sciences)

MS8 “Nonlinear waves in continuous media”

Organizers: **Vladimir I. Erofeev** (Mechanical Engineering Research Institute of the Russian Academy of Sciences or MERI RAS), **Alexey V. Porubov** (IPME RAS, Saint Petersburg)

MS9 “Mechanics of glassy and ceramic products and technologies”

Organizers: **Vladislav Golyatin** (Corning Scientific Center, St. Petersburg, Russia), **Alexander Dotsenko** (Corning Scientific Center, St. Petersburg, Russia)

MS10 “Mathematical modeling in petroleum engineering”

Organizers: **Vitaly A. Kuzkin** (Peter the Great St. Petersburg Polytechnic University; IPME RAS, Russia), **Alexander M. Linkov** (IPME RAS, Russia; Rzeszow University of Technology, Poland), **Liliana Rybarska-Rusinek** (Rzeszow University of Technology, Poland)

MS11 “Delamination and fracture under dynamic loading”

Organizers: **Yuri V. Petrov** (St. Petersburg State University, IPME RAS, Russia), **Boris N. Semenov** (St. Petersburg State University, Russia), **P. Venkatarayanan** (Indian Institute of Technology, India).



# June 24, Monday

ROOM A

*Morning Session*

PLENARY LECTURES

CHAIRPERSON ALEXANDER FREIDIN

9:00 – 9:45	<b>REGISTRATION</b>
9:45 – 10:10	<b>Opening ceremony</b>
10:10 – 10:30	<b><u>Sergeev V.V.</u></b> About Peter the Great St. Petersburg Polytechnical University
10:30 – 11:00	<b><u>Kachanov M.L.</u></b> On the possibilities offered by micromechanics, and its limitations
11:00 – 11:30	<b><u>Sevostianov I.</u></b> Heterogeneous materials with anisotropic matrices
<i>Coffee break</i>	
11:50 – 12:20	<b><u>Corigliano A.</u></b> Recent advances in microsystems and printed sensors
12:20 – 12:50	<b><u>Triantafyllidis N.</u></b> Stability problems in mechanics: multiphysics & multiscale aspects (a mecanician's perspective?)
12:50 – 13:20	<b><u>Ganghoffer J.-F.</u></b> Static and acoustic properties of architected materials and metamaterials by homogenization methods



ROOM B

*Afternoon Session, June 24*

MINISYMPOSIUM “ADVANCES IN MICROMECHANICS OF MATERIALS”

ORGANIZERS: IGOR SEVOSTIANOV AND ELENA N. VILCHEVSKAYA

CHAIRPERSON IGOR SEVOSTIANOV

- 14:10 – 15:00**    **Lomov S.V.** Micromechanics of fibrous composites based on micro-CT images
- 15:00 – 15:30**    **Traxl R., Pichler C., Lackner R.** Assessment of the influence of non-spherical inclusions on effective mechanical properties utilizing the replacement Eshelby tensor approach
- 15:30 – 16:00**    **Nazarenko L., Chirkov A., Stolarski H., Altenbach H.** Analysis of behavior of structural elements made of functionally graded carbon nanotubes reinforced materials
- 16:00 – 16:30**    **Giraud A., Sevostianov I., Kushch V., Cosenza P., Prêt D., Barthélemy J.F., Trofimov A.** Effective electrical conductivity of anisotropic rocks: application to mudstones

*Coffee break*

- 16:50 – 17:20**    **Eremeyev V.A.** Nonlocal Surface Elasticity and Anti-Plane Surface Waves
- 17:20 – 17:50**    **Markov A., Trofimov A., Sevostianov I., Kanaun S.** Software for fast calculation of the contribution of inhomogeneities to the effective properties of elastic media
- 17:50 – 18:20**    **Smirnov A.M., Krasnitskii S.A., Gutkin M.Yu.** Misfit stress relaxation in core-shell nanowires with a polyhedral core via the nucleation of prismatic dislocation loops

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WELCOME PARTY



ROOM C  
*Afternoon Session, June 24*  
MINISYMPOSIUM “MECHANICS OF ARCHITECTURED MATERIAS”  
ORGANIZERS: IGOR BERINSKII AND STEPHAN RUDYKH  
CHAIRPERSON ELENA GREKOVA

- 14:00 – 14:25**    Comi C., Moscatelli M., Marigo J.-J. Two scale homogenization in ternary locally resonant metamaterials
- 14:25 – 14:50**    Berinskii I. Elastic properties and wave propagation in auxetic lattice materials
- 14:50 – 15:15**    Nieves M., Garau M., Carta G., Brun M. Dynamic analysis and design of gyro-elastic structures with applications
- 15:15 – 15:40**    Dai L.H. On Reynolds dilation in shear banding of metallic glasses
- 15:40 – 16:05**    Grekova E.F. Linear homogeneous isotropic elastic constrained reduced Cosserat medium: an acoustic metamaterial
- 16:05 – 16:30**    Shufrin I., Shmukler A. Energy absorption in fragmented solids and structures

*Coffee break*

NANO-, MICRO- AND MESOMECHANICS  
CHAIRPERSON HENGAN WU

- 16:50 – 17:10**    Lukin A., Mozhgova N., Popov I. Equilibria forms branching for initially curved elastic elements of MEMS
- 17:10 – 17:30**    Pandey A.K., Erravelly I.R. Influence of prestress on the frequency of nanobeams based on modified strain gradient theory
- 17:30 – 17:50**    Igumnova V.S., Shtukin L.V., Lukin A.V. Dynamics of the microresonator in the regime of supercritical compression
- 17:50 – 18:10**    Ledovskaya Y., Lukin A., Popov I. Nanoparticle mass detection using suspended microchannel resonator with account for internal fluid flow
- 18:10 – 18:30**    Nasedkin A., Nasedkina A., Rajagopal A. Finite element analysis of effective properties of thermoelastic transversely isotropic material with nanosized pores

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WELCOME PARTY

ROOM D

*Afternoon Session, June 24*

MINISYMPOSIUM “DELAMINATION AND FRACTURE UNDER DYNAMIC LOADING”

ORGANIZERS: YURI V. PETROV, BORIS N. SEMENOV AND PARAMESWARAN  
VENKITANARAYANAN

CHAIRPERSON PARAMESWARAN VENKITANARAYANAN

- 14:00 – 14:25**     **Selyutina N.** Structural-temporal characteristics of the metal multilayer composite GLARE
- 14:25 – 14:50**     **Zaychenko O.K., Morozov V.A.** Modeling high-rate deformation and fracture of metal rings by the magnetic pulse technique
- 14:50 – 15:15**     **Smirnov I.** Evaluation of critical stresses for quasi-brittle materials at various loading rates
- 15:15 – 15:40**     **Utkin A., Petrov Y.** Comparative study of dynamic fracture peculiarities in materials with various internal structure
- 15:40 – 16:05**     **Skripnyak V.V., Skripnyak V.V., Skripnyak E.G., Kozulyn A.A.** The mechanical behavior of magnesium alloy Mg-3%Al-1%Zn at high strain rates and elevated temperature
- 16:05 – 16:30**     **Kazarinov N., Gruzdkov A., Petrov Y.** Dynamic fracture of linear elastic oscillator chains

*Coffee break*

- 16:50 – 17:15**     **Skripnyak V.A., Skripnyak N.V., Skripnyak V.V., Skripnyak E.G.** Simulation of the dynamic behavior of Zr-Nb alloys
- 17:15 – 17:40**     **Logachev A., Petrov Y., Volkov G.** Threshold effects of fracture under combined pulsed and high-frequency loading
- 17:40 – 18:05**     **Sedova O.S., Sedova O.S.** Corrosion of a spherical vessel under time dependent load

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WELCOME PARTY

ROOM E  
*Afternoon Session, June 24*  
MECHANICAL AND CIVIL ENGINEERING APPLICATIONS  
CHAIRPERSON OLGA LOBODA

- 14:00 – 14:20 Gajdoš L., Šperl M. Effects of steel pipe segment straightening on tensile and fracture mechanical properties of resulting semiproducts
- 14:20 – 14:40 Petukhov D., Keller I. The exact explicit formulae for reconstruction of plastic strain distribution in surface treated plates and cylindrical samples
- 14:40 – 15:00 Guchinsky R., Petinov S. Fatigue reliability of structures: methodology of assessment and problems
- 15:00 – 15:20 Kondakov I., Fomin V. Fast finite element modeling method for strength analysis of lattice composite aircraft structures
- 15:20 – 15:40 Mareskin I., Shanygin A. Hybrid metal-composite frame structures for mechanical and civil engineering applications
- 15:40 – 16:00 Melkumova E.V., Golubev Yu.F. Transfer by a manipulator with a three-finger grasp of a brittle cylinder
- 16:00 – 16:20 Sabirov R., Vjatkin A. Experimental study of vibrational thermal convection of liquid in a rotating thick cylindrical layer

*Coffee break*

POSTER SESSION  
CHAIRPERSON ANDREY MURACHEV

- 16:40 – 16:42 Atroshenko S.A. Evaluation criteria for the wear resistance of high-chromium steels
- 16:42 – 16:44 Boev E.V., Volkov I.A., Igumnov L.A. A continual model of damaged media and its realization in static and dynamic problems of mechanics of deformable solids
- 16:44 – 16:46 Lamzin D., Bragov A., Lomunov A., Konstantinov A., Gonov M. Features of dynamic testing of brittle media
- 16:46 – 16:48 Markov I.P., Igumnov L.A., Abrosimov N.A., Novoseltseva N.A. Numerically modeling high-rate deformation and progressive damage of inhomogeneous composite shells of revolution under explosive loading
- 16:48 – 16:50 Boev E.V., Igumnov L.A., Ipatov A.A. Boundary-element modelling of a slow compressional wave in poroviscoelastic media
- 16:50 – 16:52 Fedorovsky G.D. Endochronic modifications of the Bugakov, Kachanov and Rabotnov approaches in modeling of strength and elastoviscoplasticity
- 16:52 – 16:54 Saitova R.R., Arutyunyan A.R., Arutyunyan R.A. The damage parameter changes during high-temperature creep

- 16:54 – 16:56**     **Solyaev Y., Lurie S., Korolenko V.** Numerical solutions of crack problems in second gradient elasticity
- 16:56 – 16:58**     **Garishin O.K., Shadrin V.V., Kornev Yu.V.** Comprehensive mechanical studies of rubber micro- and nanocomposites promising for the tire industry. Uniaxial and biaxial tests
- 16:58 – 17:00**     **Mikheev D.S., Kolesnikova A.L., Gutkin M.Yu., Romanov A.E.** Misfit dislocation loops in composite spheres with axisymmetric truncated spherical inclusions
- 17:00 – 17:02**     **Zegzhda A.S., Polyanskiy V.A.** Model of the effect of low natural concentrations of hydrogen on cylindrical steel samples
- 17:02 – 17:04**     **Romashin S.N., Shorkin V.S.** Relationship between mechanical and adhesive characteristics of elastic materials
- 17:04 – 17:06**     **Lebedev S.F.** Cluster recombination method as a way to accelerate the gravity systems' calculations
- 17:12 – 18:12**     POSTERS IN THE RECREATIONAL AREA

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## WELCOME PARTY





# June 25, Tuesday

ROOM A

*Morning Session*

PLENARY LECTURES

CHAIRPERSON ANTON KRIVTSOV

- 9:00 – 9:30**     **Politi A.** Heat transport in one-dimensional systems
- 9:30 – 10:00**   **Gendelman O.V., Paul J.** Kapiza resistance in benchmark one-dimensional models of heat conductivity
- 10:00 – 10:30**   **Müller I.** Thermodynamics and Hyperbolicity
- 10:30 – 11:00**   **Krivtsov A.M.** Wave and diffusive heat processes in ultrapure materials
- 11:00 – 11:30**   **Guzev M.A., Sadovskii V.M.** Inhomogeneous distribution of thermal characteristics in the harmonic crystal
- Coffee break*
- 11:50 – 12:20**   **Dmitriev S.V., Bebikhov Y.V., Semyonov A.S.** Effect of discrete breathers on macroscopic properties of nonlinear chains
- 12:20 – 12:50**   **Huppert H.E.** Flow of granular material: from the collapse of an anthill to the destruction of the Antarctic Ice Sheet
- 12:50 – 13:20**   **Roux J.-N., Fall A., Tang A.-M., Chevoir F.** Basic properties of model granular materials, with or without cohesion



ROOM B

*Afternoon Session, June 25*

MINISYMPOSIUM “ADVANCES IN MICROMECHANICS OF MATERIALS”

ORGANIZERS: IGOR SEVOSTIANOV AND ELENA N. VILCHEVSKAYA

CHAIRPERSON IGOR SEVOSTIANOV

- 14:10 – 15:00 Sanahuja J., Tran N.-C., Charpin L., Adia J.-L., Huang S., Guihard V., Chen F. Micromechanics of concrete: overview of challenges and contributions from EDF RandD
- 15:00 – 15:30 Cosenza P., Fauchille A.-L., Prêt D., Hedan S. Representative Elementary Area of Clay-Rocks inferred by Micromechanics
- 15:30 – 16:00 Barthélémy J.-F., Giraud A., Sanahuja J., Sevostianov I. Maxwell and other matrix composite homogenization schemes in ageing linear viscoelasticity
- 16:00 – 16:30 Lurie S., Volkov-Bogorodskii D. On the role of surface related effects in micromechanics of composites

*Coffee break*

- 16:50 – 17:20 Ryvkin M., Kumar P., Kuchеров L. Fracture toughness of materials with hierarchical microstructure
- 17:20 – 17:50 Golden K.M. What can polar sea ice tell us about the mechanics of composite materials?
- 17:50 – 18:20 Krasnitckii S.A., Krauchanka M.Yu., Mordasova E.A., Gutkin M.Yu. The interaction between coaxial circular prismatic dislocation loops in an elastic sphere

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WATER EXCURSION ON THE RIVERS AND CANALS

ROOM C  
*Afternoon Session, June 25*  
HEAT TRANSFER AND WAVE MOTION  
CHAIRPERSON VITALY KUZKIN

- 14:10 – 14:30**    **Kuzkin V.** Unsteady ballistic heat transport in harmonic crystals with poly-atomic unit cell
- 14:30 – 14:50**    **Sokolov A.A., Krivtsov A.M., Müller W.H.** Heat conduction in 1D harmonic crystal. Finite or infinite? The comparison of two approaches
- 14:50 – 15:10**    **Murachev A.S., Krivtsov A.M.** Transition to thermal equilibrium in a deformed crystal
- 15:10 – 15:30**    **Lyazhkov S.D., Kuzkin V.A.** Transition to thermal equilibrium in face-centered cubic lattice
- 15:30 – 15:50**    **Lukin A., Popov I., Skubov D.** Nonlinear dynamics of microbeam resonators under periodical and pulse opto-thermal excitations
- 15:50 – 16:10**    **Gavrilov S.N., Krivtsov A.M.** Steady-state kinetic temperature distribution in a two-dimensional harmonic scalar lattice lying in a viscous environment and subjected to a point heat source
- 16:10 – 16:30**    **Papirovsky A.A., Lukin A.V., Popov I.A.** Analytical and numerical modelling of surface acoustic waves in rotating piezoelectric media

*Coffee break*

- 16:50 – 17:10**    **Kiselev A.P., Zlobina E.A.** High-frequency diffraction by a contour with a jump of curvature
- 17:10 – 17:30**    **Motygin O.V.** Non-uniqueness in the linear problem of forward motion of bodies in a two-layer fluid
- 17:30 – 17:50**    **Tretyakov D.A., Belyaev A.K., Stepanov A.V.** Acoustoelastic effect in metals with damage
- 17:50 – 18:10**    **Galyautdinova A.R., Belyaev A.K., Tretyakov D.A.** Investigation of plastic deformations in metals using angular diagrams of acoustic anisotropy
- 18:10 – 18:30**    **Evseenkov A.S., Krivtsov A.M.** Ballistic and diffusion heat transfer in one-dimensional harmonic crystal with defects

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WATER EXCURSION ON THE RIVERS AND CANALS

ROOM D

*Afternoon Session, June 25*

MINISYMPOSIUM “DELAMINATION AND FRACTURE UNDER DYNAMIC LOADING”

ORGANIZERS: YURI V. PETROV, BORIS N. SEMENOV AND PARAMESWARAN  
VENKITANARAYANAN

CHAIRPERSON YURI PETROV

- 14:20 – 14:45**     **Granichin N., Volkov G., Petrov Y.** Delamination of plain adhesive joint under combined dynamic actions
- 14:45 – 15:10**     **Martemyanov A., Petrov Y.** Estimation of rock destruction incubation time for high stress-rate experiments
- 15:10 – 15:35**     **Mikhailova N., Petrov Y.** Analytical modelling and dynamic strength estimation in spall fracture
- 15:35 – 16:00**     **Kats V., Morozov V.** Modification variables of propagation of the elastic-plastic waves through the media preliminary subjected to exposure with the weak magnetic field
- 16:00 – 16:25**     **Pronina Y., Maksimov A.** On crack propagation in a two-component thermally reinforced pipe

*Coffee break*

POSTER SESSION

CHAIRPERSON POLINA DYATLOVA

- 16:45 – 16:47**     **Vavilov D.S., Indeitsev D.A., Semenov B.N.** On the Method of Variable Interval
- 16:47 – 16:49**     **Markov I.P., Igumnov L.A.** Three-dimensional BEM applied for wave propagation in anisotropic linearly elastic half space
- 16:49 – 16:51**     **Chetverikov A.P., Geraskin E.I., Lakhno V.D., Shigaev A.S.** Beyond the Peyrard-Bishop-Dauxois model of DNA: BUBBLES and discrete breathers
- 16:51 – 16:53**     **Maliy V., Ryzhih N., Rudnitskih D., Petrov V.** Influence of material parameters on the reflective properties of a dielectric substrate coated with graphene
- 16:53 – 16:55**     **Gudkina Z.V., Argunova T.S., Gutkin M.Yu.** 3D analysis of crack propagation in human dentin by x-ray microtomography
- 16:55 – 16:57**     **Davydova A.** Simulation of heat propagation in a scalar triangular crystal lattice
- 16:57 – 16:59**     **Rozhkov M.A., Smirnov A.M., Kolesnikova A.L., Gutkin M.Yu.** Molecular dynamics simulation of mechanical behavior of YSZ ceramics/graphene nanocomposites
- 16:59 – 17:01**     **Kiryan D.G., Kiryan G.V.** Modeling the evolution of a gravitating bodies cluster based on absolutely inelastic collisions

- 17:01 – 17:03**     **Sviyazheninov E.** Resonant Excitation of the Rotating Predominantly Tangential Waves in the Annular Domains
- 17:03 – 17:05**     **Zumberov P.A., Yakovlev Y.A., Polyansky V.A.** Calculating activation energies of titanium, manufactured with 3D printing technology, using multi-channel hydrogen diffusion model
- 17:05 – 17:07**     **Erofeeva I.V., Rodyushkin V.M.** Determination of bending stresses in steel samples by the method of acoustoelasticity using Rayleigh surface wave
- 17:07 – 17:09**     **Ezhenkova S., Chivilikhin S.** Mathematical modelling of sedimentation process of nanoparticles in the vessel of infinite depth
- 17:20 – 18:20**     POSTERS IN THE RECREATIONAL AREA
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## WATER EXCURSION ON THE RIVERS AND CANALS



ROOM E

*Afternoon Session, June 25*

MINISYMPOSIUM “GRANULAR MATERIALS AND GRAIN-FLUID MIXTURES”

ORGANIZERS: JEAN-NOËL ROUX

CHAIRPERSON JEAN-NOËL ROUX

- 14:00 – 14:25**    **Jenkins J., Berzi D.** Kinetic Theory for a dense, inclined, granular flow over an erodible bed
- 14:25 – 14:50**    **Berzi D., Jenkins J.T., Richard P.** Extended Kinetic Theory for collisional shearing over and within an inclined, erodible bed
- 14:50 – 15:15**    **Boltachev G.Sh., Ivanov M.G., Risovaniy S.A., Chingina E.A.** Concentrated nanoparticle suspension: 2D simulations by stochastic dynamics
- 15:15 – 15:40**    **Daraio D., Villoria J., Stitt H.E., Marigo M., Alexiadis A., Ingram A.** Application of Discrete Element Method (DEM) simulations to support the investigation of gamma alumina phase transformation induced by mechanical means
- 15:40 – 16:05**    **Hsiau S.-S., Sheng L.-T., Chou S.-H., Dinh C.-B.** Heat transfer in granular media
- 16:05 – 16:15**    **Fomicheva M.A., Vilchevskaya E.N.** Funnel flow of a Navier-Stokes-fluid with potential applications to micropolar media
- 16:15 – 16:35**    **Gamez A.J., Kori H.** On the collective motion of a population of microswimmers

*Coffee break*

*Break*

NONLINEAR AND MULTIBODY DYNAMICS, CHAOS AND VIBRATION

CHAIRPERSON JEAN-NOËL ROUX

- 17:00 – 17:20**    **Sun B.** On Kepler’s third law of 3-body system
- 17:20 – 17:40**    **Chen L.Q., Li X.** Effects of weights on vertical nonlinear oscillations

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WATER EXCURSION ON THE RIVERS AND CANALS



ROOM F

*Afternoon Session, June 25*

MINISYMPOSIUM “MECHANICS AND DESIGN OF MATERIALS”

ORGANIZERS: HENGAN WU

CHAIRPERSON HENGAN WU

- 14:00 – 14:25**     **Wu H.** Noncovalent interface between melamine and graphene oxide: atomistic mechanism and design optimization
- 14:25 – 14:50**     **He X.** Bistable design of functionally graded carbon nanotube-reinforced plates
- 14:50 – 15:15**     **Zhang G., Liu H., Jin J., Cheng W., Zhang X.** Numerical simulation study on casing strength of underground gas storage and an optimization method of casing
- 15:15 – 15:40**     **He L.** Photo-switchable chevron topographies of glassy nematic coatings
- 15:40 – 16:05**     **Ni Y.** Interfacial strengthening and toughening strategies of nacreous biomimetic composites
- 16:05 – 16:30**     **Zhu Y.** Mechanical investigation of biosynthesized bacterial cellulose nanocomposites through multiscale modeling

*Coffee break*

- 16:50 – 17:15**     **Xu J., Song Z.-Q., Ma E.** High-toughness  $\text{Zr}_{61}\text{Ti}_2\text{Cu}_{25}\text{Al}_{12}$  bulk metallic glass: failure under torsional loading and Mode III fracture toughness
- 17:15 – 17:40**     **Zhang H., Chen Y., Liu X., Hu G.** Asymmetric elastic metamaterial and its application to elastic cloaking design

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WATER EXCURSION ON THE RIVERS AND CANALS

# June 26, Wednesday

ROOM A

*Morning Session*

PLENARY LECTURES

CHAIRPERSON ALEXEI PORUBOV

- 9:00 – 9:30**     **Vaisberg L.A.** Vibration technology research achievements of the Mekhanobr scientific school and their industrial applications
- 9:30 – 10:00**     **Dell’Isola F.** Synthesis of metamaterials: the role of pantographic substructures
- 10:00 – 10:30**     **Lipatov I., Fam W.K.** Modeling panel flutter in the framework of the asymptotic theory of viscous gas flows
- 10:30 – 11:00**     **Müller W.H.** Thence the moment of momentum!
- 11:00 – 11:30**     **Lacarbonara W.** Asymptotic response of systems and materials with hysteresis

*Coffee break*

- 11:50 – 12:20**     **Venkitanarayanan P., Faye A.** Crack initiation toughness of PMMA under dynamic loading
- 12:20 – 12:50**     **Conte R.M., Musette M., Ng T.W., Chengfa W.** New solution of the cubic complex Ginzburg-Landau equation
- 12:50 – 13:20**     **Banichuk N.V., Ivanova S.Yu., Jeronen J.** Moving material and dynamic problem of aerothermoelastic vibrations and instability



ROOM B

*Afternoon Session, June 26*

MINISYMPOSIUM “ADVANCES IN MICROMECHANICS OF MATERIALS”

ORGANIZERS: IGOR SEVOSTIANOV AND ELENA N. VILCHEVSKAYA

CHAIRPERSON ELENA VILCHEVSKAYA

- 14:00 – 14:50**    **Gusev A.A.** Nanoscale homogenization of the viscoelastic properties of polymer networks
- 14:50 – 15:20**    **Smirnov A., Vilchevskaya E., Sevostianov I.** Evaluation of the effective viscoelastic properties of a material containing multiple flakes using fraction-exponential operators
- 15:20 – 15:50**    **Nomura S.** Stress function approach in micromechanics

*Coffee break*

DISCUSSION (ROUND TABLE)



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BANQUET

ROOM C

*Afternoon Session, June 26*

MINISYMPOSIUM “NEW DEVELOPMENTS IN GENERALIZED CONTINUA -  
THEORIES AND EXPERIMENTS”

ORGANIZERS: WOLFGANG H. MÜLLER AND FRANCESCO DELL’ISOLA

CHAIRPERSON WOLFGANG MÜLLER

- 14:00 – 14:25 Abali B.E., Yang H., Papadopoulos P. Parameter determination of meta-materials in generalized mechanics via computational homogenization
- 14:25 – 14:50 Ganzosch G., Barchiesi E., Drobnicki R., Müller W.H. Experimental investigations of 3D-deformations of additively manufactured pantographic structures
- 14:50 – 15:15 Yang H., Abali B.E., Müller W.H. On homogenization and computation of metamaterials in generalized mechanics
- 15:15 – 15:40 Vakaeveva A.B., Krasnitckii S.A., Smirnov A.M., Grekov M.A., Gutkin M.Yu. Stress concentration and distribution in ceramic composites with triple junction pores
- 15:40 – 16:05 Morozova A.S., Vilchevskaya E.N., Bessonov N.M. Drug delivery from polymer-based nanopharmaceuticals simulation of the diffusion process
- 16:05 – 16:30 Grekov M.A., Sergeeva T.S. Surface stress effects in the problem on an interaction of edge dislocations with a planar interface

*Coffee break*

*Break*

PHASE TRANSITIONS AND NONLINEAR ELASTICITY

CHAIRPERSON MARGARITA EVARD

- 16:55 – 17:15 Sharipova L.L., Freidin A.B. Stress-strain diagrams on phase transformation paths: equilibrium two-phase microstructures and optimal composite microstructures
- 17:15 – 17:35 Svistkov A.L. Thermodynamics of hyperelastic materials with relaxing heat fluxes
- 17:35 – 17:55 Chernysheva T.Y., Evard M.E., Volkov A.E. Modeling of the superelastic behavior of CuAlNi — single crystals accounting anisotropy of elastic properties
- 17:55 – 18:15 Evard M.E., Belyaev F.S., Volkov A.E. Modeling of martensite reorientation in FeMn-based shape memory alloys with an account of the threefold symmetry of HCP martensite
- 18:15 – 18:35 Kolotova L., Starikov S. Atomistic simulations of phase and structure transitions in U-Mo alloy

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BANQUET

ROOM D

*Afternoon Session, June 26*

MINISYMPOSIUM “MECHANICS OF GLASSY AND CERAMIC PRODUCTS AND TECHNOLOGIES”

ORGANIZERS: VLADISLAV GOLYATIN AND ALEXANDER DOTSSENKO

CHAIRPERSON ALEXANDER DOTSSENKO

- 14:10 – 14:30**     **Golyatin V.Yu. (CSC Director).** Corning Inc. S&T Overview and Corning Scientific Center in St. Petersburg
- 14:30 – 14:45**     **Dotsenko A.V. (CSC Adviser).** Corning Scientific Center history and collaboration with Universities
- 14:45 – 15:05**     **Melikhov I., Chivilikhin S.** Evolution of free surface small perturbations of a fluid with variable viscosity
- 15:05 – 15:25**     **Filkin V., Levandovskiy A., Panin N.** Viscoelastic deformation of the fused silica cylinder under gravity in the presence of beta-cristobalite layer growth at the silica surface
- 15:25 – 15:45**     **Shubin S., Gorelchenko P.** Dynamics of a flexible beam falling on a rigid surface
- 15:45 – 16:05**     **Antipin N., Belodubrovskij D., Shubin S., Freidin A., Gorelchenko P.** Modeling for a crack in an elastic plate with a V-shaped notch
- 16:05 – 16:25**     **Sorokina E., Luo J., Gorelchenko P., Zhang B.** Micromechanical glass modeling in LS-DYNA

*Coffee break*

PLASTICITY

CHAIRPERSON ILYA KELLER

- 16:45 – 17:05**     **Sadovskii V., Guzev M., Sadovskaya O.** Simulation of plastic deformation based on the Cosserat continuum theory using high-performance computing
- 17:05 – 17:25**     **Keller I., Adamov A., Petukhov D., Kazantsev A., Trofimov V.** Experimental attestation of the model of plastic deformation and fracture of sheet metal under its forming and simulation of some technological processes
- 17:25 – 17:45**     **Galimzyanova K.N., Kovtanyuk L.V., Panchenko G.L.** Consideration of viscosity at different stages of deformation of elastic-plastic material of a hollow sphere
- 17:45 – 18:05**     **Savikovskii A., Semenov A., Getsov L.** Crystallographic orientation and delay time influence on thermal fatigue strength of single-crystal nickel super-alloys

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BANQUET

ROOM E

*Afternoon Session, June 26*

MINISYMPOSIUM “NONLINEAR WAVES IN CONTINUOUS MEDIA”

ORGANIZERS: VLADIMIR I. EROFEEV AND ALEXEY V. PORUBOV

CHAIRPERSON ALEXEY PORUBOV

- 14:10 – 14:30**    **Kovaleva M., Starosvetsky Y.** Damped driven response of granular chain, Part 1 - External Excitation
- 14:30 – 14:50**    **Starosvetsky Y., Kislovsky V., Kovaleva M.** Damped driven response of granular chain, Part 2: Parametric Excitation
- 14:50 – 15:10**    **Manevitch L., Kovaleva M., Smirnov V.** Nonstationary oscillatory dynamics of the sine lattice
- 15:10 – 15:30**    **Porubov A., Osokina A.** Nonlinear localized waves in a two-dimensional graphene lattice
- 15:30 – 15:50**    **Bulygin A.N., Pavlov Yu.V.** New ansatzes for solution of nonlinear nonautonomous Klein-Fock-Gordon equation
- 15:50 – 16:10**    **Leontyeva A.V., Erofeev V.I.** The influence of nonlinear elasticity of a basement on localized waves propagating in Timoshenko beam
- 16:10 – 16:30**    **Kosevich Yu.A., Strelnikov I.A.** Effects on nonlinear elasticity and interatomic interactions on bending instability of few-layer graphene embedded in a strained polymer matrix

*Coffee break*

- 16:50 – 17:10**    **Korznikova E., Shepelev I., Chetverikov A., Dmitriev S., Sharapov E.** Simulation of shock waves in 2D materials
- 17:10 – 17:30**    **Ryabov P.N., Kudryashov N.A., Muratov R.V.** Shear banding localization phenomena in steel and copper
- 17:30 – 17:50**    **Chetverikov A.P., Ebeling W., Velarde M.G.** Localized and solitonic plane waves in 2D cuprate-like layers
- 17:50 – 18:10**    **Il'ichev A., Fu Y., Shargatov V.** Dynamical stability of running solitary waves in fluid-filled elastic membrane tubes
- 18:10 – 18:30**    **Sargsyan S.** Structural and continual-micropolar beam models of nanocrystalline materials

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BANQUET



# June 27, Thursday

ROOM A

*Morning Session*

PLENARY LECTURES

CHAIRPERSON DMITRII INDEITSEV

- 9:00 – 9:30 Kantorovich L., Abbasi D., Sang H., Perez L., Floris A., Amabilino D.B., Raval R., Recio J.M. Preferential motion of enantiomeric small molecule walkers under an external field
- 9:30 – 10:00 Kienzler R., Schneider P. A beam — just a beam in linear plane bending
- 10:00 – 10:30 Lebon F. On multiscale modeling of interfaces
- 10:30 – 11:00 Frolov M.E., Chistiakova O.I. A posteriori error estimates for plates and shells
- 11:00 – 11:30 Ankudinov A.V. On the accuracy of the AFM probe-sample contact stiffness measurements

*Coffee break*

- 11:50 – 12:20 Freidin A.B., Morozov A.V., Müller W.H., Poluektov M., Figiel L., Sharipova L.L. Kinetics, blocking and stability of stress-assisted chemical reaction fronts
- 12:20 – 12:50 Lurie S., Volkov-Bogorodskii D., Belov P. Variational models of coupled gradient thermoelasticity and thermal conductivity in micromechanics of composites
- 12:50 – 13:20 Le K.C. Thermodynamic dislocation theory

*Coffee break*



ROOM B

*Afternoon Session, June 27*

COMPLEX MEDIA: MICROPOLAR THEORY, CHEMOMECHANICS, ACOUSTIC  
METAMATERIALS ETC.

CHAIRPERSON ALEXANDER FREIDIN

- 14:10 – 14:30**    **Hanappier N., Charkaluk E., Triantafyllidis N.** On coupled electromagnetic-thermomechanical modeling of electric motors: theory and application
- 14:30 – 14:50**    **Tribunskiy M.I., Morozov A.V., Freidin A.B., Müller W.H.** Modeling intermetallic Cu-Sn compound growth under mechanical stress and electric field
- 14:50 – 15:10**    **Dudin D.S., Keller I.E.** Relaxation of space perturbations in coupled diffusion-rheological system, its asymptotics and corresponding structural models
- 15:10 – 15:30**    **Rickert W., Müller W.H.** Cavity flow of nematic liquid crystals — a parameter study
- 15:30 – 15:50**    **Frolova K.P., Vilchevskaya E.N., Polyanskiy V.A.** Explanation of inhomogeneous distribution of hydrogen by means of the Cosserat-type theories of continua
- 15:50 – 16:10**    **Grigoreva P.M., Vilchevskaya E.N.** On hydrogen diffusion models in steels
- 16:10 – 16:30**    **Varshavchik E.A., Polyanskiy V.A.** Simulation of hydrogen thermo-desorption spectra for cylindrical iron samples

*Coffee break*

- 16:50 – 17:10**    **Petrenko S., Charkaluk E., Freidin A.** The influence of plastic strains on a chemical reaction front propagation in spherically-symmetric problems
- 17:10 – 17:30**    **Poluektov M., Morozov A., Freidin A., Müller W., Figiel L.** Computational modelling of stress-affected localised chemical reactions

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EXCURSION TO FABLAB

ROOM C  
*Afternoon Session, June 27*  
NANO-, MICRO- AND MESOMECHANICS  
CHAIRPERSON ALEKSEI LUKIN

- 14:00 – 14:20    **Koissin V., Lomov S.V., Verpoest I., Eckers V., Witzel V., Drechsler K.** Fiber-free zones and their irregularity in structurally stitched NCF preforms
- 14:20 – 14:40    **Koludarov P., Lukin A., Popov I.** System-level modelling of MEMS accelerometer nonlinear dynamics
- 14:40 – 15:00    **Zavorotneva E.V., Lukin A.V., Popov I.V.** Dynamics of disk-based MEMS Coriolis vibrating gyroscope
- 15:00 – 15:20    **Sheinerman A.G., Morozov N.F., Gutkin M.Yu.** Effect of grain boundary sliding on fracture toughness of ceramic/graphene composites
- 15:20 – 15:40    **Bobylev S.V., Sheinerman A.G.** Effect of crack bridging on the toughening of ceramic/graphene composites
- 15:40 – 16:00    **Gutkin M.Yu., Kolesnikova A.L., Chernakov A.P., Romanov A.E.** Misfit stress relaxation by dislocation loops in core-shell nanowires
- 16:00 – 16:20    **Krauchanka M.Yu., Krasnitckii S.A., Gutkin M.Yu., Kolesnikova A.L., Romanov A.E.** Stress relaxation in icosahedral nanoparticles by nucleation of circular prismatic dislocation loops
- 16:20 – 16:40    **Mirantsev L.** Superfluidity inside carbon nanotubes

*Coffee break*

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EXCURSION TO FABLAB

ROOM D

*Afternoon Session, June 27*

MINISYMPOSIUM “MATHEMATICAL MODELING IN PETROLEUM ENGINEERING”

ORGANIZERS: VITALY A. KUZKIN, ALEXANDER M. LINKOV AND LILIANA  
RYBARSKA-RUSINEK

CHAIRPERSON VITALY KUZKIN

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|---------------|--|
| 14:00 – 14:20 | <u>Shel E.</u> Pseudo3D and analytical hydrofracturing models as the critical limits of the Planar3D model                             |
| 14:20 – 14:40 | <u>Trofimov V.A.</u> , <u>Filippov U.A.</u> Contour convergence regularities for openings in coal                                      |
| 14:40 – 15:00 | <u>Dvornikova A.A.</u> , <u>Gaev A.V.</u> , <u>Shevchuk R.E.</u> Computational-experimental method of pipeline defect diagnostics      |
| 15:00 – 15:20 | <u>Riabokon E.</u> , <u>Turbakov M.</u> , <u>Poplygin V.</u> , <u>Wiercigroch M.</u> Rock fracture during oil well perforation process |
| 15:20 – 15:45 | <u>Sergeev A. D.</u> Damping properties of reactive effects on an open rod of variable length  |

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EXCURSION TO FABLAB

# June 28, Friday

ROOM A

*Morning Session*

PLENARY LECTURES

CHAIRPERSON MARIAN WIERCIGROCH

- 9:00 – 9:30**     **Goryacheva I.G.** Effect of structure parameters on the tribotechnical characteristics of fibrous composites
- 9:30 – 10:00**     **Akhatov I.** Phase-change in nanoscale confinement
- 10:00 – 10:30**     **Kukushkin S.A.** The brittle fracture of solids is an analogue of a first-order phase transition
- 10:30 – 11:00**     **Smirnov N.N., Nikitin V.F., Stamov L.I., Skryleva E.I.** Digital models forecasting the effectiveness of strategies for enhancing oil recovery
- 11:00 – 11:30**     **Wiercigroch M.** Complex dynamics of pendula systems for energy harvesting

*Coffee break*

- 11:50 – 12:20**     **Linkov A., Rejwer E., Rybarska-Rusinek L.** Improved fast multipole methods for inhomogeneous media with far-range interactions
- 12:20 – 12:50**     **Petrov Y.** Fracture and structural transformations: statics vs dynamics
- 12:50 – 13:20**     **Garagash I.A.** Mechanics of deformation of discrete materials with movable microfragments



ROOM B  
*Afternoon Session, June 28*  
MINISYMPOSIUM ON BIOMECHANICS  
ORGANIZER: OLGA S. LOBODA  
CHAIRPERSON OLGA LOBODA

- 14:20 – 14:45    **Hedrih A., Mitrovic-Jovanov A., Lazarevic M.** Influence of the sperm velocity on fertilization capacity in the oscillatory model of mouse Zona Pellucida
- 14:45 – 15:10    **Voronkova E.B., Bauer S.M.** Solid mechanics models in ophthalmology
- 15:10 – 15:35    **Bykov N.Y., Andreeva T.A., Berkovich A.E., Kozyrev S.V., Lukin A.Ya.** Heating and destruction of biological tissue by high-intensity focused ultrasound
- 15:35 – 16:00    **Kovalev O., Portnaia M., Ilin I., Akulshin Y.** Elaboration and analysis of functional forearm prosthesis with neuro-physiological control system
- 16:00 – 16:20    **Fomin D., Shanygin A., Kondakov I.** Application of bionic principles for design of cylindrical fuselage structure of civil aircraft
- Coffee break*
- 16:40 – 17:05    **Izmaylova Y., Freidin A.** The impact of prestress in a growth layer on bone remodeling
- 17:05 – 17:30    **Dolgirev A.A., Maltseva N.A.** Development of the legs fixation mechanism for Lokomat therapy training device

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CLOSING CEREMONY





ROOM C

*Afternoon Session, June 28*

MINISYMPOSIUM “MATHEMATICAL MODELING IN PETROLEUM ENGINEERING”

ORGANIZERS: VITALY A. KUZKIN, ALEXANDER M. LINKOV AND LILIANA  
RYBARSKA-RUSINEK

CHAIRPERSON ALEXANDER LINKOV

- 14:20 – 14:45**    **Li K., Smirnov N.N., Pestov D.A., Kiseev A.B.** The simulation of the evolution process of hydraulic-fracturing fluid lag in preexisting crack
- 14:45 – 15:10**    **Markov N., Linkov A., Rybarska-Rusinek L.** On identification of stress-contrast by using pumping history
- 15:10 – 15:35**    **Lapin R.L., Kuzkin V.A., Kachanov M.** Calculation of the normal and shear compliances of a three-dimensional crack taking into account contact between the crack surfaces
- 15:35 – 16:00**    **Abramov I.A.** A model of hydraulic fractured horizontal well for debit computation of slanged gas and oil
- 16:00 – 16:25**    **Choudhary H.D., Choudhary Shambhu D., Choudhary Shankar D.** What is the distance in the arena of science at which the analytical solution to the Navier-Stokes equation becomes available?

*Coffee break*

- 16:45 – 17:10**    **Antonov I.** Modeling of the hydraulic fracturing by energized fluids and foams
- 17:10 – 17:35**    **Mushchak N.D., Starobinskii E.B., Hlopin S.V.** Speed-up methods for the explicit time integration scheme in Planar3D model

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CLOSING CEREMONY

ROOM D

*Afternoon Session, June 28*

MINISYMPOSIUM “EXTREME LOADING ON STRUCTURES”

ORGANIZERS: NIKITA F. MOROZOV, VLADIMIR A. BRATOV AND DANILA  
PRIKAZCHIKOV

CHAIRPERSON VLADIMIR BRATOV

- 14:00 – 14:25 Prikazchikova L., Alzaidi A., Kaplunov J. The edge bending wave on a stiffened plate
- 14:25 – 14:50 Manna S., Kaplunov J., Prikazchikov D. Rayleigh waves induced by interior initial conditions
- 14:50 – 15:15 Borodin E.N., Mayer A.E., Gutkin M.Yu. Grain boundary sliding and rotation as the main mechanisms of high-strain-rate plasticity in nanocrystalline solids
- 15:15 – 15:40 Volkov G.A., Mikhailova N.V., Bratov V.A. Numerical and experimental study of dynamic yielding
- 15:40 – 16:05 Bratov V., Ilyashenko A., Kuznetsov S., Morozov N., Rashidov T. Seismic barriers: theory and numerical simulations
- 16:05 – 16:30 Nikonov A., Bratov V., Kazakov D. Influence of loading rate on viscoelastic behaviour of polymers

*Coffee break*

- 16:50 – 17:15 Kazarinov N.A., Bratov V.A., Morozov N.F., Balandin V.V. Experimental and numerical investigation of dynamic fracture of PMMA specimens due to impact
- 17:15 – 17:40 Prikazchikov D.A., Khajiyeva L.A., Kudaibergenov Askar K., Kudaibergenov Askat K. Explicit models for surface waves in pre-stressed elastic half-space

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CLOSING CEREMONY

ROOM E  
*Afternoon Session, June 28*

SOLIDS AND STRUCTURES  
CHAIRPERSON TATYANA DOMANSKAYA

- 14:20 – 14:40 Yakovenko A.A., Goryacheva I.G. The contact problem for a system of punches and the elastic base
- 14:40 – 15:00 Páczelt I., Mróz Z. A new class of optimization problems related to contact interaction
- 15:00 – 15:20 Domanskaya T.O., Malkov V.M., Malkova Yu.V. Mathematical modeling of large deformations of a plane with a crack for harmonic materials
- 15:20 – 15:40 Gordeev I., Kolotova L. Research of Si-Au and Si-Al nanoparticles crystallisation
- 15:40 – 16:00 Orelma H. Continuum approach to high-cycle fatigue
- 16:00 – 16:20 Al-Lubani S.E., Ahmad I.A. Double aging of heat-treated aluminum alloy of (7075) and (6061) to increase the hardness number

*Coffee break*

QUANTUM NANOMECHANICS  
CHAIRPERSON VICTOR PETROV

- 16:40 – 17:00 Petrov V., Syrbu I., Tschudi T. Quantum nanomechanics: a new approach
- 17:00 – 17:20 Fedorova A.N., Zeitlin M.G. Non-Gaussian states: a first sign of complex events
- 17:20 – 17:40 Zeitlin M.G., Fedorova A.N. Sheaves, schemes, and all that: new looking glass for quantum phenomena

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CLOSING CEREMONY

ROOM F  
*Afternoon Session, June 28*

POSTER SESSION

CHAIRPERSON ANDREY MURACHEV

- 14:00 – 14:02**    **Mordasova E.A., Kolesnikova A.L., Gutkin M.Yu., Romanov A.E.** Stress relaxation at the boundaries of a hollow cylindrical inclusion of finite height by generation of rectangular prismatic dislocation loops
- 14:02 – 14:04**    **Mikaelyan K.N., Gutkin M.Yu., Sheinerman A.G.** Transfer of dislocation glide across grain boundaries in metal-graphene nanocomposites
- 14:04 – 14:06**    **Cheng C.-H., Yang A.-S., Ku H.-C.** Experimental and numerical studies for a shear mode piezoelectric actuator applied to inkjet printheads
- 14:06 – 14:08**    **Okura N., Narita H., Suzuki M.** Meandering flow between two parallel flat plates in a uniform flow
- 14:08 – 14:10**    **Suzuki M., Okura N.** Large eddy simulation of flow around two elongated parallel plates in a uniform flow
- 14:10 – 14:12**    **Shaw J., Chang Y.-C.** Design of a piezoelectric cantilever beam for energy harvester for use in bicycles
- 14:12 – 14:14**    **Yang A.-S., Chen P.-A., Hsieh W.-H., Cheng C.-H.** Thermal analysis for an x-axis feed drive system
- 14:14 – 14:16**    **Lee C.-Y., Hu H.-L., Wu Y.-T., Peng J.-W.** Design and simulation of an acoustic metamaterial plate incorporating tunable shape memory cantilever absorbers
- 14:16 – 14:18**    **Su Y.-M., Hsieh C.-J.** The Influence of Balcony Greening of High-rise Buildings on Urban Wind and Thermal Environment: A Case of an Ideal City
- 14:18 – 14:20**    **Sedova Y.S., Polyanskiy V.A.** HEDE model vs inner pressure model in calculating the strength of hydrogenated metals
- 14:24 – 15:24**    POSTERS IN THE RECREATIONAL AREA

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CLOSING CEREMONY





**Location:**

Peter the Great  
St. Petersburg Polytechnic University,  
Research Institute of new materials and  
technologies  
(NIK: Nauchno-issledovatel'skiy korpus), Polytechnicheskaya 29, building 11, St. Petersburg.

**Orbita hotel:** 4 Nepokorennyyh Prospect

**Oktiabrskaya hotel:** 10 Ligovsky prospect

**Sputnik hotel:** 36 Toreza prospect

**Graffiti L Hostel:** 33–35 Ligovsky Prospect

**Banquet at the restaurant Crystal Hall:** 26 Gatchinskaya Street

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SCHEDULE: MORNING SESSIONS (ROOM A)

PLENARY SPEAKERS

June	24 (p. 8)	25 (p. 14)	26 (p. 21)	27 (p. 26)	28 (p. 30)
9:00	Registration	Politi	Vaisberg	Kantorovich	Goryacheva
9:30	Opening ceremony (9:45)	Gendelman	Dell'Isola	Kienzler	Akhatov
10:00	Sergeev (10:10)	Müller I.	Lipatov	Lebon	Kukushkin
10:30	Kachanov	Krivtsov	Müller W.	Frolov	Smirnov
11:00	Sevostianov	Guzev	Lacarbonara	Ankudinov	Wiercigroch
11:50	Corigliano	Dmitriev	Venkitanarayanan	Freidin	Linkov
12:20	Triantafyllidis	Huppert	Conte	Lurie	Petrov
12:50	Ganghoffer	Roux	Banichuk	Le	Garagash

SCHEDULE: AFTERNOON SESSIONS

June	ROOM B	ROOM C	ROOM D	ROOM E	ROOM F
24	Advances in micromechanics of materials (MS) (p. 9)	Mechanics of architected materials (MS) (p. 10) Nano-, micro-, and mesomechanics	Delamination and fracture under dynamic loading (MS) (p. 11)	Mechanical and civil engineering applications (p. 12) Posters (pp. 12–13)	
25	Advances in micromechanics of materials (MS) (p. 15)	Heat transfer and wave motion (p. 16)	Delamination and fracture under dynamic loading (MS) (p. 17) Posters (pp. 17–18)	Granular materials and grain-fluid mixtures (MS) (p. 19) Nonlinear and multibody dynamics, chaos and vibration	Mechanics and design of materials (MS) (p. 20)
26	Advances in micromechanics of materials (MS) (p. 22)	New developments in generalized continua — Theories and Experiments (MS)(p. 23) Phase transitions and nonlinear elasticity	Mechanics of glassy and ceramic products and technologies (Dow Corning) (MS) Plasticity (p. 24)	Nonlinear waves in continuous media (MS) (p. 25)	
27	Complex media: micropolar theory, chemomechanics, acoustic metamaterials (p. 27)	Nano-, micro-, and mesomechanics (p. 28)	Mathematical modeling in petroleum engineering (MS) (p. 29)		
28	Biomechanics (MS) (p. 31)	Mathematical modeling in petroleum engineering (MS) (p. 32)	Extreme loading on structures (MS) (p. 33)	Solids and structures Quantum nanomechanics (p. 34)	Posters (p. 35)