

XLVIII INTERNATIONAL
SUMMER SCHOOL – CONFERENCE
ADVANCED PROBLEMS IN MECHANICS

JUNE 21–26, 2020,
ONLINE

APM 2020 PROGRAMME



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



POLYTECH
Peter the Great
St. Petersburg Polytechnic
University



Санкт-Петербургский
научный центр РАН





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 2020 is partially supported by the Russian Foundation for Basic Research, the Ministry for Science and Education, Gazpromneft.

General Information

The International Conference “**Advanced Problems in Mechanics 2020**” is the forty eighth 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.

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
- M.B. Babenkov, IPME RAS, Peter the Great St. Petersburg Polytechnic University, Russia
- 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, Gdansk 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.E. Huppert, University of Cambridge, United Kingdom
- H. Irschik, Johannes Kepler University of Linz, Austria
- M.L. Kachanov, Tufts University, Medford, USA
- B.L. Karihaloo, Cardiff University, UK
- D. Koroteev, Center for Hydrocarbon Recovery, Scoltech (Digital Petroleum), Russia
- S.V. Kuznetsov, IPMech RAS, Russia
- 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
- 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. Rudskoi, 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. Simonov, Gazpromneft Science & Technology Center, Russia
- 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)
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- Maria Loboda (Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia)
- Darina Shulepnikova (Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia)
- Anastasia Vilchevskaya (Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia)

The conference is organized with help of our **service agency “Monomax PCO”**:
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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.
- fluid mechanics
- wave motion
- nano-, micro- and mesomechanics
- phase transitions and nonlinear elasticity
- solids and structures
- nonlinear and multibody dynamics, chaos and vibration
- plasticity
- mechanical and civil engineering applications
- heat transfer

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 “Mathematical modeling in petroleum engineering”

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

MS2 “New approaches for oil and gas reservoirs simulation”

Organizers: **Maksim Simonov** (Gazpromneft Science & Technology Center, Russia), **Dmitry Koroteev** (Center for Hydrocarbon Recovery, Scoltech, Russia)

- MS3 “Geometry, Topology, Fractal and Multifractal modeling in geosciences”
Organizers: **Aleksander Kalyuzhnyuk** (Gazpromneft Science & Technology Center, Russia)
- MS4 “Extreme loading on structures”
Organizers: **Danila Prikazchikov** (Keele University, UK), **Nikita F. Morozov** (St. Petersburg State University, IPME RAS, Russia), **Vladimir A. Bratov** (IPME RAS, Russia)
- MS5 “Nonlinear waves in continuous media”
Organizer: **Vladimir I. Erofeev** (Mechanical Engineering Research Institute of the Russian Academy of Sciences or MERI RAS, Nizhniy Novgorod, Russia), **Alexey V. Porubov** (IPME RAS, St. Petersburg, Russia)
- MS6 “Earthquakes and Seismic Protection”
Organizers: **Tzu-Kang Lin** (National Taiwan University, Taiwan), **Sergey V. Kuznetsov** (IPMech RAS, Russia), **Vladimir Bratov** (IPME RAS, Russia)
- MS7 “Scientific and technical creativity in experimental mechanics”
Organizer: **Mikhail B. Babenkov** (IPME RAS, Peter the Great St. Petersburg Polytechnic University, Russia), **Polina A. Dyatlova** (Peter the Great St. Petersburg Polytechnic University, IPME RAS, Russia)
- MS8 “Contact mechanics, tribology and technology”
Organizers: **Irina G. Goryacheva** (Ishlinsky Institute for Problems in Mechanics RAS, Russia), **Elena V. Torskaya** (Ishlinsky Institute for Problems in Mechanics RAS, Russia), **Jeng-Haur Horng** (National Formosa University, Taiwan)
- MS9 “Heat/energy transport in discrete systems”
Organizers: **Anton M. Krivtsov** (Peter the Great St. Petersburg Polytechnic University, IPME RAS, Russia)
- MS10 “Sustainability of the oil and gas industry: challenges and opportunities”
Organizers: **Alexandra Boytsova** (Peter the Great St. Petersburg Polytechnic University, Russian Gas Society), **Nadezhda Sheveleva** (Ecooilgasconsulting).

June 22, Monday

ROOM A

June 22

PLENARY LECTURES

CHAIRPERSON ANTON M. KRIVTSOV

ZOOM ID 82589822556

- 12:00 – 12:05** **Welcoming address by Andrei I. Rudskoi, rector of Peter the Great St.Petersburg Polytechnic University**
- 12:05 – 12:30** **Opening ceremony**
- 12:30 – 13:05** **Huppert H. Stokes drift over coral layers: theory; experiments in the lab. and at sea; and biological implications**
- 13:05 – 13:40** **Politi A. Nearly normal conductivity in chains of nonlinear oscillators**
- 13:40 – 14:15** **Kaplunov J. Dynamic homogenisation for thin and periodic structures**
- 19:00 – 19:35** **Steigmann D. The Role of Mechanics in the Study of Biological Cell Membrane**



ROOM B

June 22

MINISYMPOSIUM “HEAT/ENERGY TRANSPORT IN DISCRETE SYSTEMS”

ORGANIZERS: ANTON M. KRIVTSOV AND VITALY A. KUZKIN

CHAIRPERSON VITALY A. KUZKIN

ZOOM ID 82589822556

- 14:20 – 14:45 **Gendelman O.V., Shiroky I.B. (Keynote Lecture)** Front propagation in bi-stable non-degenerate systems: model dependence and universality
- 14:45 – 15:10 **Krivtsov A.M. (Keynote Lecture)** Hooke’s chain
- 15:10 – 15:30 **Gavrilov S.N., Shishkina E.V.** Heat conduction in 1D harmonic crystal: discrete-to-continuum limit and slow-and-fast motions decoupling
- 15:30 – 15:50 **Dmitriev S.V., Bebikhov Y.V., Korzniikova E.A., Kuzkin V.A., Krivtsov A.M.** Thermal equilibration in linear and nonlinear chains
- 15:50 – 16:10 **Xiong D., Wang J., Dmitriev S. V.** Thermal transport in long-range interacting Fermi-Pasta-Ulam chains
- 16:10 – 16:30 **Anufriev R., Gluchko S., Volz S., Nomura M.** Ballistic heat conduction in semiconductor nanowires

Coffee break

- 16:40 – 17:00 **Korzniikova E., Semenov A., Dmitriev S.V.** Delocalized nonlinear modes in crystals: role in energy localization and transfer
- 17:00 – 17:20 **Kuzkin V.A.** Ballistic resonance and thermalization in Fermi-Pasta-Ulam-Tsingou chain at finite temperature
- 17:20 – 17:40 **Bryukhanov I.A., Sokolov A.A., Kuzkin V.A., Krivtsov A.M.** Unsteady heat transport in graphene: a MD study
- 17:40 – 18:00 **Panchenko A.Yu., Berinskii I.E., Kuzkin V.A.** Ballistic heat propagation in a 2D harmonic graphene lattice
- 18:00 – 18:20 **Sokolov A.S., Kuzkin V.A., Krivtsov A.M., Müller W.H.** Ballistic heat conduction in graphene: The approach based on analytical results obtained from lattice dynamics and dispersion relations measured in MD simulations and experiments
- 18:20 – 18:40 **Liazhkov S.** Heat transfer in a one-dimensional crystal with attached mass
- 18:40 – 19:00 **Murachev A.S., Krivtsov A.M.** Heat transfer in a 1D crystal. The limit of applicability of the continuum approximation

ROOM C

June 22

MINISYMPOSIUM “EARTHQUAKES AND SEISMIC PROTECTION”

ORGANIZERS: TZU-KANG LIN, SERGEY V. KUZNETSOV AND VLADIMIR BRATOV

CHAIRPERSON VLADIMIR BRATOV AND TZU-KANG LIN

ZOOM ID 84200756842

- 14:25 – 14:50** **Lin T. K. (Keynote Lecture)** Methodological aspects and results of experimental and theoretical studies of the dynamic characteristics of soil media
- 14:50 – 15:10** **Bratov V., Kuznetsov S.** Seismic barriers with complex geometry
- 15:10 – 15:30** **Prikazchikov D.** Rayleigh waves on a coated elastic half-space
- 15:30 – 15:50** **Dudchenko A. V.** Computation and analysis of dispersion curves for surface waves travelling in multilayer plates with interfacial defects
- 15:50 – 16:10** **Khan M. M., Iqbal M. A.** High Strain Rate Loading on Concrete under Compression using SHPB: - Overview

Coffee break

- 16:20 – 16:40** **Shanshin I.K., Lukin A. V., Svyatogorov I. G.** Numerical Methods of Structures Seismic Analysis
- 16:40 – 17:00** **Ilyashenko A.V., Ilyasov H.H.** On non-existence of the interfacial Stoneley waves
- 17:00 – 17:20** **Kotov V.L., Bragov A.M., Igumnov L.A., Balandin V.V., Lomunov A.K.** Methodological aspects and results of experimental and theoretical studies of the dynamic characteristics of soil media
- 17:20 – 17:40** **Kuznetsov S.** Stoneley secular equation at Wiechert condition
- 17:40 – 18:00** **Vershinin V.V.** Surface-breaking cracks as a prospective method of areal protection from seismic Rayleigh waves

FLUID MECHANICS

CHAIRPERSON ALEXANDRA BOYTSOVA

- 18:00 – 18:05** **Iulmukhametova R., Musin A., Kovaleva L.** Mathematical modeling of viscous incompressible fluid flow with suspended particles in rectangular channel
- 18:05 – 18:10** **Marzec K.** Heat transfer distribution on surfaces under an array of impinging jets with various nozzle shapes
- 18:10 – 18:15** **Manuilova V., Bachurina A., Khodosevich K., Nicolin P.** Comprehensive pressure drop model for catalytic converters
- 18:15 – 18:20** **Petrov R.I., Maksimov A.Y., Igoshina D.D., Tarasov A.V., Klyavin O.I.** Optimization of the electric vehicle HVAC duct system based on gradient method

- 18:20 – 18:25** **Valiullina V.I., Sultanguzhin R.F., Zamula Yu.S., Musin. A.A., Kovaleva L.A.** Experimental study of the thermal motion of a model emulsion in a rectangular cavity with heating walls
- 18:25 – 18:30** **Frolov O.Yu., Dyakova O. A.** Viscoplastic fluid flow in a T-shaped channel under given pressure boundary conditions
- 18:30 – 19:00** **Discussion**
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ROOM D

June 22

MINISYMPOSIUM “CONTACT MECHANICS, TRIBOLOGY AND TECHNOLOGY”

ORGANIZERS: IRINA G. GORYACHEVA, ELENA V. TORSKAYA AND JENG-HAUR HORNG

CHAIRPERSON ELENA V. TORSKAYA

ZOOM ID 84200756842

- 8:50 – 9:10** **Jeng-Haur Horng, Ging-Long Lin, Yang-Yuan Chen** Basic contact mechanics and tribology of three-body interface
- 9:10 – 9:30** **Tsukanov I.Yu.** Pressure concentration in 2D rough contacts: the effects of multiscale geometry and asperity interaction
- 9:30 – 9:50** **Belyak O.A, Kolesnikov V.I., Suvorova T.V.** Modeling antifriction properties of composite coatings based on dynamic contact problems
- 9:50 – 10:10** **Lyubicheva A.N.** Wear of composite material in full contact with viscoelastic body. Steady-state solution
- 10:10 – 10:30** **Karbashov P.S., Breki A.D.** Elements of the analytical concept of friction and wear

Coffee break

- 10:40 – 11:00** **Thi-Na Ta, Shin-Yuh Chern, Yue-Syun Wu** Study on the Characteristics of Surface Damage of ZDDP-containing Lubricating Oils
- 11:00 – 11:20** **Wei Chin-Chung** Study of Wear on raceways and Preload Decay Affect Friction and Contact Behaviour of a Vertical Transmission Ball-Screw System
- 11:20 – 11:40** **Tsvetkova G.V., Skotnikova M.A., Popov A.A., Ivanova G.V.** Increased tool wear and reduced contact stresses during machining of hard workability alloys
- 11:40 – 12:00** **Zarov V.E., Li Syanshun, Kozurev Yu. P., Sedakova E.B.** Influence of structural features of polymer composites on the load characteristics of friction pairs

ROOM E

June 22

HEAT TRANSFER AND WAVE MOTION

CHAIRPERSON NIKOLAY MARKOV

ZOOM ID 81739320118

- 11:00 – 11:05** **Filkin V., Nemov A., Kuznetsov I., Antonova O., Aristovich K., Tarotin I.** Bi-directionally coupled mechanical and electrical model of wave propagation in neuronal axons
- 11:05 – 11:10** **Mikhalchenko E.V., Nikitin V.F.** Simulation of the operation of a detonation engine
- 11:10 – 11:15** **Udalov P., Lukin A., Popov I.** Reduced Order Modeling for Thermo - Electric processes
- 11:15 – 11:20** **Vershinin V. V.** Acoustic control of cracks self-healing in plates. Part I: an impulse induced wave field in a plate with a crack parallel to its free surfaces
- 11:20 – 11:25** **Poroshin I.O., Gavrilov S.N., Shishkina E.V.** Non-stationary excitation of a trapped mode in string on elastic foundation with moving linear oscillator
- 11:25 – 11:30** **Filippenko G.V., Zinovieva T.V.** Axisymmetric oscillations of the circular cylindrical shell with pointed masses on winkler foundation
- 11:30 – 12:00** **Discussion**
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June 23, Tuesday

ROOM A

June 23

PLENARY LECTURES

CHAIRPERSON MIKHAIL B. BABENKOV

ZOOM ID 82589822556

- 12:30 – 13:05** **Altenbach H.** Method of Rheological Modeling - History, Trends, Applications
- 13:05 – 13:40** **Saccomandi G.** The Quest of the "Holy" Strain-Energy in Nonlinear Elasticity: where we are?
- 13:40 – 14:15** **Müller W., Vilchevskaya E.N.** The wonderful possibilities of micropolar theory for modeling materials and physical phenomena
- 14:15 – 14:50** **Kachanov M.L.** Mechanics of multiple cracking and damage

Coffee break



ROOM B

June 23

MINISYMPOSIUM “NEW APPROACHES FOR OIL AND GAS RESERVOIRS
SIMULATION”

ORGANIZERS: MAKSIM SIMONOV AND DMITRY KOROTEEV

CHAIRPERSON MAKSIM V. SIMONOV

ZOOM ID 82589822556

- 15:00 – 15:20** Lebedev S.F., Simonov M.V. Hybrid model for predicting oil and gas production
- 15:20 – 15:40** Gubanova A., Orlov D. Proxy Capacitance Resistance Modeling for Field Development Optimization
- 15:40 – 16:00** Kolenkina(Skryleva) E.I., Smirnov N.N., Nikitin V.F., Fakhretdinova R.R., Makeeva M.N. Modeling of liquid displacement from the porous medium taking into account the presence of hydraulic fracture
- 16:00 – 16:20** Kozhevnikov E., Guzev M., Turbakov M., Riabokon E., Poplygin V., Wiercigroch M. Dispersion properties of a heteromodular medium (on the example of sandstone)

Coffee break

- 16:30 – 16:50** Markov N., Evseenkov A., Shvarev N., Simonov M. Creation of a software model for calculating the effectiveness of the application of enhanced oil recovery methods for fractured reservoirs
- 16:50 – 17:10** Maslov A.L., Knyazeva A.G. Formation and flow of products of unerground thermal decomposition of oil shale
- 17:10 – 17:30** Panini F., Salina B. E., Costanzo P., Viberti D. Application of A*algorithm for tortuosity and effective porosity estimation of 2d rock images
- 17:30 – 17:50** Voloskov D.S., Pissarenko D.V. Adaptive basis construction for POD-based reduced order models
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ROOM C

June 23

MINISYMPOSIUM “NONLINEAR WAVES IN CONTINUOUS MEDIA”

ORGANIZERS: VLADIMIR I. EROFEEV AND ALEXEY V. PORUBOV

CHAIRPERSON VLADIMIR I. EROFEEV AND ALEXEY V. PORUBOV

ZOOM ID 84200756842

- 15:00 – 15:20** Eremeyev V. A. On antiplane surface waves in media with surface energy considering various models
- 15:20 – 15:40** Bochkarev A., Zemlyanukhin A.I. Generalized Schamel-Ostrovsky equations in nonlinear wave dynamics of cylindrical shells
- 15:40 – 16:00** Brikkel D. M., Erofeev V. I., Leonteva A. V., Nikitina E. A. Influence of material damage on the parameters of a longitudinal waves propagating in a rod. Nonlinear problems
- 16:00 – 16:20** Bulygin A.N., Pavlov Yu.V. Solution of equations for plane deformation of nonlinear model of complex crystal lattice

Coffee break

- 16:30 – 16:50** Il'ichev A.T. Characteristic parameters of nonlinear surface envelope waves beneath an ice cover under pre-stress
- 16:50 – 17:10** Kolesov D.A., Krupenin V.L., Erofeev V.I., Malkhanov A.O. Dispersion, attenuation and spatial localization of waves in metamaterial as a mass-in-mass chain
- 17:10 – 17:30** Kovaleva M., Smirnov V., Manevitch L. Non-stationary dynamics of the sine-lattice consisting of three pendula (trimer).

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

CHAIRPERSON OLGA S. LOBODA

- 17:30 – 17:35** Isaeva S. M., Grekova E. F. Influence of the external follower body torque on plane waves in the isotropic elastic linear reduced Cosserat medium
- 17:35 – 17:40** Piatysheva A., Grekova E. F. Infinitesimal internal translational/rotational viscosity in the linear viscoelastic isotropic reduced Cosserat medium: changing type of the acoustic metamaterial
- 17:40 – 17:45** Sargsyan A. H. Stability of the Micropolar Thin Round Plate
- 17:45 – 17:50** Malinovskaya E. Numerical study of the effect of surface microstructure on the air flow
- 17:50 – 17:55** Riabokon E., Wiercigroch M., Guzev M., Turbakov M., Kobiakov D. Experimental studies on static and dynamic loading of heterogeneous rocks

- 17:55 – 18:00** **Shorkin V.S., Romashin S.N., Frolenkova L.Yu., Khoroshilova M.V., Yakushina S.I.** Assessment of damage caused by the occurrence of uneven mechanical properties
- 18:00 – 18:05** **Grigoreva P.M., Vilchevskaya E.N., Polyanskiy V.A.** The mutual influence of hydrogen diffusion on the linear elastic properties of the steel
- 18:05 – 18:10** **Fedorovsky G.D.** Endochronic models of functional thermoelasticity properties of wind glass reinforced plastics and their components
- 18:10 – 18:40** **Discussion**
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ROOM D

June 23

MINISYMPOSIUM “CONTACT MECHANICS, TRIBOLOGY AND TECHNOLOGY”

ORGANIZERS: IRINA G. GORYACHEVA, ELENA V. TORSKAYA AND JENG-HAUR
HORNG

CHAIRPERSON HSIAO-YEH CHU

ZOOM ID 84200756842

- 9:00 – 9:20** **Hsiao-Yeh Chu, Ping-Hsueh Tsai** Design and Performance Evaluation of the Wire Drawing Powder Removing Device for the Wire Coil Used in the Screw or Nut Manufacturing Process
- 9:20 – 9:40** **Torskaya E.V., Stepanov F.I.** Effect of friction in sliding contact of layered viscoelastic solids
- 9:40 – 10:00** **Kao W.H., Su Y.L., Wu C.M.** Tribological, Anti-Corrosion and High Temperature Properties of Nitrided High Entropy Alloy Coatings by Reactive Magnetron Sputtering
- 10:00 – 10:20** **Yakovenko A.A., Goryacheva I.G.** Indentation of biomaterials with relaxation properties

Coffee break

- 10:30 – 10:50** **Meshcheryakova A.R., Goryacheva I.G.** Modeling of fatigue wear in rolling contact of elastic bodies
- 10:50 – 11:10** **Lycheva T.N., Lychev S.A.** The simulation the contact interaction of the needle and brain tissue
- 11:10 – 11:30** **Phiri E., Syundyukov I.S., Ivanov E.K, Skotnikova M.A., Jiangda Q., Medvedeva V. V., Krylov N. A.** Tribotechnical diagnostics of an internal combustion engine
- 11:30 – 11:50** **Evsin M., Skotnikova M.** Improving the design of a rotational viscometer for tribology
- 11:50 – 12:10** **Moskalets A.** Contact problem of water droplet erosion
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June 24, Wednesday

ROOM A

June 24

PLENARY LECTURES

CHAIRPERSON ALEXANDER B. FREIDIN

ZOOM ID 82589822556

13:00 – 13:35 **Goryacheva I.** Wear and Contact Fatigue Models in Friction Interaction of Homogeneous and Inhomogeneous Materials

13:35 – 14:10 **Dell’isola F.** Towards the synthesis of complete second gradient architected metamaterials: Micro-to-macro approaches, numerical investigations, additive manufacturing and experimental validation

Coffee break



ROOM B

June 24

MATHEMATICAL MODELING IN PETROLEUM ENGINEERING

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

CHAIRPERSON VITALY A. KUZKIN

ZOOM ID 82589822556

- 15:30 – 15:50** Lapin R.L., Tsaplin V.A., Kuzkin V.A. Simulation of hydraulic fractures using particle dynamics method
- 15:50 – 16:10** Kraeva S. O., Markov N.S., Yudin E.V., Gubanova A.E., Kotezhkov V.S. Analytical modelling of fluid filtration in the reservoir using boundary element method
- 16:10 – 16:30** Perepechkin I.M., Dochkina V.S., Zavialova N.A., Osiptsov A.A., Shel E.V., Paderin G.V. Minifrac metamodeling with Recurrent Neural Network
- 16:30 – 16:50** Paderin G. Theoretical study of self-similar fracture growth in a Pseudo3D formulation

Coffee break

- 17:10 – 17:35** Linkov A., Rejwer E., Rybarska-Rusinek L. (Keynote Lecture) Theory and application of accelerated explicit fast multipole method for modeling hydraulic fractures
- 17:35 – 18:00** Dontsov E. (Keynote Lecture) Homogenization of high-resolution rock properties for hydraulic fracture modeling
- 18:00 – 18:25** Peirce A.P. (Keynote Lecture) The Tipping Point: How tip asymptotics can enhance HF modeling
- 18:25 – 18:50** Rybarska-Rusinek L., Rejwer E., Linkov A. (Keynote Lecture) On decreasing time expense of fast multipole methods for strongly inhomogeneous systems
- 18:50 – 19:10** Shel E.V., Kabanova P.K., Paderin G.V. Technological and economical optimization of a hydraulic fracturing design with Planar3D modeling: choice of proppant, liquid and pump schedule
- 19:10 – 19:30** Starobinskii E.B., Markov N.S., Shvarev N.G., Lapin R.L. Planar 3D model as part of a fracturing simulation pipeline
- 19:30 – 19:50** Zipunova E.V., Ivanov A.V., Savenkov E.B. Finite element closest point projection method for surface PDEs

19:55 - 20:55 VIRTUAL TOUR OF ST. PETERSBURG (**ZOOM ID 82589822556**)

ROOM C

June 24

NANO-, MICRO- AND MESOMECHANICS

CHAIRPERSON ALEXEY V. LUKIN

ZOOM ID 82589822556

- 10:00 – 10:05** **Bobylev S.V., Gutkin M.Yu., Sheinerman A.G.** Yield strength of ”metal-graphene” composites with uniform and bimodal grain structures
- 10:05 – 10:10** **Leontiev V.L.** Models of nanomechanics and methods of them investigation, connected with orthogonal splines
- 10:10 – 10:15** **Lukin A.V., Popov I.A., Belyaev Ya.V., Styazhkina A.V.** Investigation of MEMS vibrating wheel gyro immunity to external excitations
- 10:15 – 10:20** **Igumnova V.S., Shtukin L.V., Lukin A.V., Popov I.A.** Nonlinear dynamics of a resonant accelerometer with two weakly coupled microbeams
- 10:20 – 10:25** **Zavorotneva E.V., Lukin A.V., Popov I.A.** Dynamics of disk-based mems coriolis vibrating gyroscope
- 10:25 – 10:30** **Chernakov A.** Misfit stress relaxation by dislocation loops in two-layer nanotubes
- 10:30 – 10:35** **Dikolenko A.A., Gutkin M.Yu., Skiba N.V.** Formation of deformation twins with zigzag configuration in aluminum nanowires
- 10:35 – 10:40** **Dubovikov E., Fomin V., Mirgorodskiy Y., Shanygin A.** Fundamental strength problems of composite laminates at micro-level
- 10:40 – 10:45** **Frolova K., Vilchevskaya E.N.** Evaluation of the effective properties of a material containing microcracks typical of hydrogen-assisted cracking
- 10:45 – 10:50** **Grekov M.A., Sergeeva T.S.** The model of surface-dislocation interaction at the nanoscale
- 10:50 – 10:55** **Gudkina Z., Gutkin M.Yu., Argunova T.S., Krasnitckii S.A.** The misfit stresses of dilatation line in a wedge-shaped elastic body with free boundaries
- 10:55 – 11:00** **Gutkin M.Yu., Kolesnikova A.L., Chernakov A.P., Romanov A.E.** Mechanics of misfit dislocation loops in core-shell nanowires
- 11:00 – 11:05** **Kmiotek M., Smusz R.** Investigation of thin obstacles effect on flow and heat transfer in the microchannel
- 11:05 – 11:10** **Nikonova A.M., Nikonov A.Yu.** Features of the rearrangement on an atomic scale of the near-surface structure of a copper polycrystal under local dynamic loading
- 11:10 – 11:15** **Nikonov A.Yu., Nikonova A.M.** Features of the development of plastic deformation of iron polycrystal under local frictional contact. Molecular dynamic simulation
- 11:15 – 11:20** **Kordos A.** Nanovortex structures in chromatography columns

- 11:20 – 11:25** **Krasnitckii S.A., Gutkin M.Yu., Kolesnikova A.L., Romanov A.E.** Misfit stress relaxation in icosahedral and decahedral core-shell nanoparticles through the generation of prismatic dislocation loop
- Coffee break*
- 11:35 – 11:40** **Mikaelyan K.N., Gutkin M.Yu., Sheinerman A.G.** Micromechanics of strengthening in metal-graphene nanocomposites
- 11:40 – 11:45** **Ryzhakov P.B., Hashemi M.R., Rossi R.** Towards direct numerical modeling of microscopic two-phase transport in polymer electrolyte fuel cells
- 11:45 – 11:50** **Sargsyan S.** To the construction of structural and continual models of multi-layer plates (nanocomposites) reinforced with graphenes
- 11:50 – 11:55** **Smirnov A.M., Kremleva A.V.** Misfit stress relaxation via dislocation formation in semipolar $\alpha - GA_2O_3/\alpha - AL_2O_3$ heterostructures
- 11:55 – 12:00** **Shuvalov G., Vakaeva A., Shamsutdinov D., Kostyrko S.** The effect of nonlinear terms in boundary perturbation method on stress concentration near the nanopatterned bimaterial interface
- 12:00 – 12:30** **Discussion**

ROOM D

June 24

MINISYMPOSIUM “NONLINEAR WAVES IN CONTINUOUS MEDIA”

ORGANIZERS: VLADIMIR I. EROFEEV AND ALEXEY V. PORUBOV

CHAIRPERSON VLADIMIR I. EROFEEV AND ALEXEY V. PORUBOV

ZOOM ID 84200756842

- 15:00 – 15:20** **Malkhanov A.O., Erofeev V.I.** Magnetoelastic waves in a nonlinear electrically conductive solid micropolar medium
- 15:20 – 15:40** **Pavlov I. S., Erofeev V. V., Kazhaev V. V., Semerikova N. P.** Nonlinear strain waves in an auxetic rod
- 15:40 – 16:00** **Popov V.S., Chernenko A.V., Popova E.V.** Hydroelastic response of a circular sandwich plate resting on Winkler foundation

Coffee break

- 16:10 – 16:30** **Manevitch L.I., Smirnov V.V.** Nonlinear dynamics of the system with anti-ferromagnetic arrangement in a weak external field. Classical description
- 16:30 – 16:50** **Porubov A.** Localized strain waves in geometrically nonlinear graphene model
- 16:50 – 17:10** **Pupyrev P., Mayer A., Lomonosov A.** Solitary acoustic pulses propagating at the tip of an elastic wedge
- 17:10 – 17:30** **Vedeneev V.** Solitons in hyperelastic tubes conveying inviscid and viscous fluid

NONLINEAR AND MULTIBODY DYNAMICS, CHAOS AND VIBRATION

CHAIRPERSON EKATERINA A. PODOLSKAYA

- 17:30 – 17:35** **Fedotov A.** Shape control and modal control strategies for active vibration suppression of continuous systems
- 17:35 – 17:40** **Shamolin M.** Systems with dynamical symmetries: qualitative analysis and integrability
- 17:40 – 17:45** **Poplygin V., Turbakov M., Riabokon E., Wiercigroch M.** Controlled rock deformations for enhancing oil recovery
- 17:45 – 17:50** **Spannan L., Woschke E.** Approximating instable operation speeds of automatic ball balancers based on design parameters
- 17:50 – 18:20** **Discussion**

19:55-20:55 VIRTUAL TOUR OF ST. PETERSBURG (**ZOOM ID 82589822556**)

June 25, Thursday

ROOM A

June 25

PLENARY LECTURES

CHAIRPERSON IGOR E. BERINSKII

ZOOM ID 82589822556

- 12:30 – 13:05** **Dauxois T.** The Fermi-Pasta-Ulam-Tsingou problem: History and Novelties
- 13:05 – 13:40** **Smirnov N.** Poly-dispersed Droplets in Streaming Flows: atomization, evaporation, combustion



ROOM B

June 25

MINISYMPOSIUM “GEOMETRY, TOPOLOGY, FRACTAL AND MULTIFRACTAL
MODELING IN GEOSCIENCES”

ORGANIZERS: ALEKSANDER KALYUZHNYUK

CHAIRPERSON ALEKSANDER KALYUZHNYUK

ZOOM ID 82589822556

- 14:20 – 14:40** **Kalyuzhnyuk A.V., Antonov V.I.** Modeling of non-stationary filtration in reservoirs with natural fractal fractures
- 14:40 – 15:00** **Blunt M., Bijeljic B., Akai T., Lin Q** Topology and energy balance to characterize wettability in porous materials
- 15:00 – 15:20** **Petukhov A.** The fractal model of fractured reservoirs based on pareto distribution

Coffee break

- 15:30 – 15:50** **Pranav P.** Topology and Geometry: Application to datasets
- 15:50 – 16:10** **Taimanov I.A., Andreeva M.V., Kalyuzhnyuk A.V., Krutko V.V.,
Russkikh N.E., Taimanov I.A.** Representative elementary volume via averaged scalar minkowski functionals
- 16:10 – 16:30** **Uchaev D.V., Malinnikova O.N., Malinnikov V.A., Uchaev Dm.V.** On the expediency of improving the quality of scanning electron microscopy images of coal specimen surfaces for further multifractal analysis
- 16:30 – 16:50** **Uchaev Dm.V., Malinnikova O.N., Malinnikov V.A., Uchaev D.V.** Multifractal interpretation of images of coal specimen surfaces to assess the degree of coal tectonic disturbance

MINISYMPOSIUM “SUSTAINABILITY OF THE OIL AND GAS INDUSTRY:
CHALLENGES AND OPPORTUNITIES”

ORGANIZERS: ALEXANDRA BOYTSOVA AND NADEZHDA SHEVELEVA

CHAIRPERSON ALEXANDRA BOYTSOVA AND NADEZHDA SHEVELEVA

- 16:50 – 17:10** **Masson R.** The outlook for heavy oil production as we struggle to move to net zero in 2050 - lessons from Canada’s oil sands.
- 17:10 – 17:30** **Streletskaya V.** Role of young generation in shaping sustainable industry
- 17:30 – 17:50** **Ahnert F.** Digitalization - Software as a key component for successful energy transition
- 17:50 – 18:10** **Paul J.** Sustainability at OMV
- 18:10 – 18:30** **Samsonov R.** New challenges to the global energy market for the Russian gas industry and their impact on the development of the domestic market and gasification of the country

Coffee break

- 18:40 – 19:00** **Sheveleva N.** Key strategies of oil-gas sector with a focus on environmental safety technologies
- 19:00 – 19:20** **Banerjee T.** Oil Refineries and Biofuels:A Sustainable Future for India
- 19:20 – 19:40** **Ancheyta J.** Upgrading of Heavy and Extra-Heavy Petroleum by Moderate Hydrotreating
- 19:40 – 20:00** **Boytsova A.** Oil and gas transportation and storage: tasks for future

ROOM C

June 25

MINISYMPOSIUM “EXTREME LOADING ON STRUCTURES”

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

CHAIRPERSON VLADIMIR A. BRATOV

ZOOM ID 84200756842

- 14:20 – 14:45 Colquitt D. (Keynote Lecture) A new class of chiral flexural waves – One-way interfacial waves
- 14:45 – 15:05 Signorini C., Nobili A. Assessment of the behaviour of low-modulus polyurethane foams subjected to severe shear deformation conditions
- 15:05 – 15:25 Shubin S., Lapina T., Gorelchenko P. Inclined collision of a flexible plate and a rigid surface
- 15:25 – 15:45 Ghulghazaryan G.R., Ghulghazaryan L.G. Free Vibrations of Thin Elastic Orthotropic Cantilever Cylindrical Panel
- Coffee break*
- 15:55 – 16:15 Kamran K., Iqbal M. A. Finite element computation of ballistic performance of reinforced concrete plates
- 16:15 – 16:35 Konstantinov A.Yu., Romanov A.I., Panov V.A., Samsonov M.A., Chirkin D.E., Bragov A.M., Igumnov L.A., Lomunov A.K. Study of the deformation and fracture of zirconium alloys under dynamic loading
- 16:35 – 16:55 Sabirova Yu.F., Khajiyeva L.A., Kudaibergenov A.K. Modeling of dynamics of a drill string with variable structure by the lumped parameters method
- 16:55 – 17:15 Nobili A. Stoneley waves in media with microstructure
- 17:15 – 17:35 Khan M.K., Iqbal M.A., Bratov V., Morozov N.F., Gupta N.K. Numerical study of failure mechanics of composite target for varying thickness

MECHANICAL AND CIVIL ENGINEERING APPLICATIONS

CHAIRPERSON MIKHAIL B. BABENKOV

- 17:35 – 17:40 Arutyunyan A. Investigation of aging of carbon fiber plastics
- 17:40 – 17:45 Atroshenko S.A. Statistical quality analysis of bag-in-box packaging for food products
- 17:45 – 17:50 Melkumova E.V., Golubev Yu. F., Koryanov V.V. The Walking Robot Rescue from an Emergency on the Back.
- 17:50 – 17:55 Bykov N. Y., Kobelev A. A., Obraztsov N. V., Surov A. V. Modeling the air mixture flow in an AC plasma torch

- 17:55 – 18:00 **Sviyazheninov E.** Multiplier Technologies for Increasing Rotor Performance
- 18:00 – 18:05 **Dragunov S.S.** Theoretical basis of the mechanism of synchronous rotation in reverse phase
- 18:05 – 18:10 **Guchinsky R., Petinov S.** Uncertainties in Fatigue Assessment of Structures in Design and in Service
- 18:10 – 18:15 **Mareskin I., Chernov A., Fomin V.** Synergy effect of interaction of protection system and hybrid metal-composite rods.
- 18:15 – 18:20 **Y. Mirgorodskiy, E. Dubovikov, D. Vedernikov, I. Mareskin, D. Fomin** Methodology of selection of rational layout for prospective structure of high aspect ratio strut-braced wing for regional aircraft
- 18:20 – 18:25 **Morozov A.V., Petrova N.N.** Effect of Carbon Nanotubes Incorporation on the Wear Resistance of Frost Resistant Compounds Based on Epichlorohydrin Rubber
- 18:25 – 18:30 **Nalepa A.** Reverse engineering in the production of blade parts
- 18:30 – 18:35 **Saitova R.R., Arutyunyan A.R., Arutyunyan R.A.** Determination of damage parameter of metallic materials from experimental creep curves
- 18:35 – 18:40 **Serovaev G.S., Kosheleva N.A., Gusev G.N.** Strain measurement in concrete sample under static loading using embedded fiber-optic sensors
- 18:40 – 18:45 **Prozorova E.** Corollaries of the Ostrogradsky-Gauss theorem for numerical simulation in aeromechanics
- 18:45 – 19:15 **Discussion**

ROOM D

June 25

PHASE TRANSITIONS AND NONLINEAR ELASTICITY

CHAIRPERSON POLINA GRIGORYEVA

ZOOM ID 82589822556

- 11:00 – 11:05** **Barbotko M. A., Lubimova O. N.** Method for calculating stress evolution in glass-metal composite taking into account structural and mechanical relaxation processes
- 11:05 – 11:10** **Evard M., Volkov A.E., Belyaev F.S., Chernysheva T.Yu.** The lattice deformation tensor and crystallographic resource for bcc-hcp martensitic transformation in TiZr shape memory alloy
- 11:10 – 11:15** **Belyaev F.S., Volkov A.E., Evard M.E.** Simulation of TiNi alloy plastic deformation in the austenitic state by microstructural modeling
- 11:15 – 11:20** **Knyazeva A.G., Kryukova A.G.** The synthesis of composites with reinforcing particles on a thin substrate
- 11:20 – 11:25** **Fekry M., Lychev S.A.** Reducing of residual stresses in metal parts produced by SLM additive technology with selective induction heating
- 11:25 – 11:30** **R.S. Telyatnik** Ab initio calculation of high-order nonlinear elastic properties of 2H, 3C, 4H, 6H polytypes of SiC, AlN and GaN
- 11:30 – 12:00** **Discussion**



June 26, Friday

ROOM A

June 26

PLENARY LECTURES

CHAIRPERSON KSENIA FROLOVA

ZOOM ID 82589822556

- 12:30 – 13:05** Guzev M.A., Wei L., Qi C. The Airy Stress Function for Non-Euclidean Model of a Continuous Medium and Description of Residual Stresses
- 13:05 – 13:40** Pustovskikh A.A. Problems of mechanics in the oil and gas industry
- 13:40 – 14:15** Vetyukov Y. Mechanics of axially moving structures and industrial applications

Coffee break



ROOM B

June 26

MINISYMPOSIUM “EXTREME LOADING ON STRUCTURES”

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

CHAIRPERSON DANILA PRIKAZCHIKOV

ZOOM ID 82589822556

- 14:40 – 15:00** Prikazchikova L. Antiplane vibrations of a three-layer strongly inhomogeneous rectangle
- 15:00 – 15:20** Selyutina N. Influence of Mg and Cu on the dynamic yield stress of aluminium alloys
- 15:20 – 15:40** Smirnov I., Volkov G. Probabilistic approach to evaluate dynamic strength of quasi-brittle materials
- 15:40 – 16:00** Wilde M.V., Surova M.Yu. Edge and quasi-edge waves propagating along a coated edge of a plate

Coffee break

- 16:10 – 16:30** Tak S. K., Iqbal M. A. Axial compression and energy absorption characteristics of thin walled mild steel tubes
- 16:30 – 16:50** Volpini V. Love waves at the interface of microstructured materials
- 16:50 – 17:10** Savatorova V., Talonov A. Mathematical modeling of wave propagation in preloaded elastic materials with multiscale structure
- 17:10 – 17:30** Martemyanov A., Deshkovskiy V., Rozhko A., Bogdan S. Stability of mine floors under action of heavy striker

PLASTICITY

CHAIRPERSON ALEXANDER B. FREIDIN

- 17:30 – 17:35** Mityukov A.V., Malkin A.Ya., Kulichikhin V.G. The plasticity of highly concentrated non-colloidal suspensions
- 17:35 – 17:40** Sheinerman A.G., Gutkin M.Y. Strength and ductility of metal/graphene composites with bimodal grain size distribution: a mechanism-based model
- 17:40 – 18:10** Discussion
- 18:10 – 18:25** Closing Ceremony

18:25 - 19:25 QUIZ PLEASE (**ZOOM ID 82589822556**)

ROOM C
June 26

MINISYMPOSIUM “SCIENTIFIC AND TECHNICAL CREATIVITY IN EXPERIMENTAL
MECHANICS”

ORGANIZERS: MIKHAIL B. BABENKOV AND POLINA A. DYATLOVA
CHAIRPERSON MIKHAIL B. BABENKOV

ZOOM ID 84200756842

- 14:40 – 15:00 **Rickert W., Müller W.H.** Dynamics of Hollow Cylindrical Magnets
- 15:00 – 15:20 **Ganzosch G., Barchiesi E., Müller W.H.** Notes on the manufacturing and testing of pantographic structures
- 15:20 – 15:40 **Kondakov I., Chernov A., Shanygin A.** Experimental Assessment of Protected Unidirectional CFRP Ribs against Low-Velocity Impact
- 15:40 – 16:00 **Timoshenko V.A., Babenkov M.B., Belousova E.A., Islamov B.A., Lebedev S.F., Vasilyeva A.U.** Experimental study on hydraulically-driven fracture initialization and propagation in the gelatin mixture
- 16:00 – 16:20 **Rybakovskaya A.A., Nikiforov D.A., Senkin I.S., Tsykunov O.I.** Correlation model of fracturing fluid viscosity with regard to proppant concentration

SOLIDS AND STRUCTURES

CHAIRPERSON KSENIA FROLOVA

- 16:20 – 16:25 **Afnas'ev V. S., Banichuk N.V., Ivanova S.Yu.** Critical Velocities and Stability of the Axially Moving Webs
- 16:25 – 16:30 **Afnas'ev V. S., Banichuk N. V., Ivanova S. Y.** On stability of axially moving tensioned viscous material
- 16:30 – 16:35 **Nedin R.** Regarding some direct and inverse problems of heterogeneous 2D bodies in conditions of residual stress-strain state
- 16:35 – 16:40 **Shamina A., Zvagiun A.V.** Elliptic cracks in three-dimensional space
- 16:40 – 16:45 **Dudarev V.V., Vatulyan A.O.** Investigation of steady-state vibrations of an elastic cylinder with a FG coating
- 16:45 – 16:50 **Kashtanova S.V., Gruzdkov A.A., Rzhonsnitskiy A.V.** Mathematical approaches to the solution of stresses problem in cylindrical shell with a hole
- 16:50 – 16:55 **Orlova T.S., Latynina T.A., Murashkin M.Yu.** Influence of high pressure torsion on microstructure, mechanical properties and electrical conductivity of Al-Zr-Mg alloy
- 16:55 – 17:00 **Sedova Yu. S., Polyanskiy V. A., Bessonov N. M.** Features of applying HEDE model to description of the destruction of materials induced by hydrogen
- 17:00 – 17:05 **Shanygin A.** Hybrid airframes based on unidirectional composite structures

- 17:05 – 17:10** **Smirnov A.L., Vasiliev G.P.** Free vibration frequencies of a non-homogeneous circular plate
- 17:10 – 17:15** **Varshavchik E.A., Polyanskiy V.A., Chevrychkina A.A.** Finite-element modeling of the process of hydrogen desorption from a metal cylindrical sample and determination of hydrogen binding energy
- 17:15 – 17:20** **Zamula Yu.S., Musin A.A., Kovaleva L.A.** Microstructure study of asphaltene emulsion by atomic force microscopy
- 17:20 – 17:50** **Discussion**
- 17:50 – 18:05** **Closing Ceremony**

18:25 - 19:25 QUIZ PLEASE (**ZOOM ID 82589822556**)