

## Day 1 – Monday, June 22

08.30–09.45 **REGISTRATION**

09.45–10.00 **OPENING CEREMONY**

10.00–11.30 **PLENARY LECTURES – I**

*Chair: D.A. Indeitsev.*

10.00–10.45 **A.M. Krivtsov.** One-dimensional crystals and heat superconductivity.

10.45–11.30 **W.H. Müller.** Mechanics of celestial bodies: An old but long neglected branch of the mechanics community.

11.30–11.50 **COFFEE BREAK**

11.50–13.20 **PLENARY LECTURES – II**

*Chair: A.M. Krivtsov.*

11.50–12.35 **A.V. Metrikine.** Dynamic stability of structures interacting with generalized flows.

12.35–13.20 **M. Wang, X. Gao, S. Li, E.A. Zimmermann, C. Riedel, B. Busse, V.V. Silberschmidt.** Fracture processes in cortical bone: effect of microstructure.

### **LUNCH BREAK**

14.15–14.30 **MWM OPENING**

*Chair: A. Kuznetsova.*

14.30–15.15 **M.L. Kachanov.** Rough fractures versus traction-free cracks: similarities and differences.

15.15–16.40 **MWM PRESENTATIONS**

*Chair: A. Kuznetsova.*

16.40–17.00 **COFFEE BREAK**

17.00–18.30 **MWM POSTERS, POSTER SESSION**

**18.30 WELCOME PARTY**

## Day 2 – Tuesday, June 23

### ROOM I

- 10.00–11.30 **PLENARY LECTURES – III** Chair: *A.B. Freidin*.  
10.00–10.45 *R. Kienzler, P. Schneider*. Consistent Plate Theories.  
10.45–11.30 *V.A. Babeshko, O.V. Evdokimova, O.M. Babeshko, E.M. Gorshkova, I.B. Gladskoi*. Directed antenna for block structure.  
11.30–11.50 **COFFEE BREAK**  
11.50–13.50 **MECHANICS OF MEDIA WITH MICROSTRUCTURE, PHASE AND CHEMICAL TRANSFORMATIONS – I** Chair: *A.D. Sergeev*.  
11.50–12.20 Key-note lecture. *S. Rudykh*. Multiscale design of functional composites.  
12.20–12.50 Key-note lecture. *A.B. Freidin, S.E. Petrenko, E.N. Vilchevskaya*. Kinetics of chemical reaction fronts in elastic and inelastic solids.  
12.50–13.10 *E.A. Ivanova, E.N. Vilchevskaya*. Formulation of dynamic problems for the micropolar continuum in Eulerian description.  
13.10–13.30 *A.L. Korzhenevskii*. Strain induced incommensurate structures in vicinity of the reconstructive phase transitions.  
13.30–13.50 *E.L. Aero, A.L. Korzhenevskii*. Theory of plane stress structures in crystals experiencing austenite-martensite phase transformation.

### LUNCH BREAK

- 14.50–16.50 **MECHANICS OF MEDIA WITH MICROSTRUCTURE, PHASE AND CHEMICAL TRANSFORMATIONS – II** Chair: *E.N. Vilchevskaya*.  
14.50–15.10 *C. Liebold, W.H. Müller*. Generalized continua and size effects in elastostatic bending experiments.  
15.10–15.30 *L.L. Sharipova, A.B. Freidin*. Kinetics of phase transitions in elastic and inelastic solids.  
15.30–15.50 *V. Bratov, E. Borodin*. Comparison of dislocation density based approaches for prediction of defect structure evolution in aluminium and copper processed by ECAP.  
15.50–16.10 *A.L. Glazov, K.L. Muratikov*. Photoacoustic thermoelastic imaging of indented areas in metals.  
16.10–16.30 *E.V. Shishkina, S.N. Gavrilov*. Scale-invariant initial value problems with applications to the dynamical theory of stress-induced phase transformations.  
16.30–16.50 *A.I. Shveykin, P.V. Trusov, E.R. Sharifullina, T.V. Ostanina, P.S. Volegov*. The multilevel model of inelastic and superplasticity deformation of polycrystalline metals.  
16.50–17.10 **COFFEE BREAK**  
17.10–18.30 **MECHANICS OF MEDIA WITH MICROSTRUCTURE, PHASE AND CHEMICAL TRANSFORMATIONS – III** Chair: *V. Bratov*.  
17.10–17.30 *P.S. Volegov, D.S. Gribov, A.Yu. Yanz, D.G. Selukov, A.I. Shveykin*. Multilevel modeling of deformation of polycrystals with a small grain size under complex loading.  
17.30–17.50 *V Lalin, E. Zdanchuk*. The strong and the weak form of the initial boundary-value problem for the linear reduced Cosserat continuum.  
17.50–18.10 *S.N. Shubin, A.B. Freidin*. Elastomer composites with phase-changing fillers in sealing application.  
18.10–18.30 *A.D. Sergeev, D.A. Indeitsev*. The local criterion to simulate long-wave dynamics phenomena in a regular multi-body chain by means of the 1D-continuum dynamics.

## Day 2 – Tuesday, June 23

### ROOM II

#### 11.50–13.50 **NONLINEAR DYNAMICS, CHAOS AND VIBRATION**

*Chair: D.Yu. Skubov.*

11.50–12.10 **M.A. Guzev.** The system of inverted pendulums.

12.10–12.30 **I.I. Blekhman, L.I. Blekhman, L.A. Vaisberg, V.B. Vasilkov, K.S. Ivanov, K.S. Yakimova.** Nonlinear vibration-induced effects in mechanisms, fluids, loose and combined media: new results.

12.30–12.50 **N.V. Naumova, V.S. Sabaneev, P.E. Tovstik, T.P. Tovstik.** Vibrations of thin elastic body in contact with an incompressible fluid.

12.50–13.10 **A.B. Morgulis, K.I. Ilin.** Steady streaming in a vibrating container at high Reynolds numbers.

13.10–13.30 **F. Maurin, A. Spadoni.** Wave propagation in buckled-beams.

13.30–13.50 **M.V. Shamolin.** Multidimensional pendulum in a nonconservative force field.

### LUNCH BREAK

#### 15.00–16.50 **SOLIDS AND STRUCTURES – I**

*Chair: V.V. Silberschmidt.*

15.00–15.30 Key-note lecture. **A. Roy, V. Nekouie, V.V. Silberschmidt.** Indentation study of mechanical behaviour of Zr-Cu-based metallic glass.

15.30–15.50 **V. Flambaum, G. Martin, B. Pavlov.** A resonance mechanism of earthquake.

15.50–16.10 **M.B. Babenkov, A.M. Krivtsov, D.V. Cvetkov.** Initial value problems for the heat transfer process in ideal crystals.

16.10–16.30 **Yu. Vetyukov.** Buckling and supercritical behavior of axially moving plates.

16.30–16.50 **A.Y. Zemlyanova.** A new model of fracture with a curvature-dependent surface tension.

#### 16.50–17.10 **COFFEE BREAK**

#### 17.10–18.50 **SOLIDS AND STRUCTURES – II**

*Chair: E.A. Podolskaya.*

17.10–17.30 **M.M. Dannert, V.A. Kuzkin.** Dynamic buckling of a column under constant rate compression: analytical solution and finite element study.

17.30–17.50 **A.R. Dehadrai, I. Sharma, S.S. Gupta.** Dynamics of a large ring-shaped structure towed via a heavy rope.

17.50–18.10 **A.P. Kiselev.** Non-plane surface waves in anisotropic layered medium.

18.10–18.30 **G.V. Kostin, V.V. Saurin.** A projection approach to vibration analysis of elastic beams with the triangular cross section.

18.30–18.50 **A.H. Sargsyan, S.H. Sargsyan.** Geometrically nonlinear static theory of thin elastic micropolar shallow shells.

### EXCURSION

## Day 3 – Wednesday, June 24

### ROOM I

#### 10.00–11.30 PLENARY LECTURES – IV

*Chair: I.E. Berinskii.*

10.00–10.45 **S.A. Lurie, P.A. Belov, N.P. Tuchkova, E.D. Lykosova.** Role of superficial effects in modeling of behavior of superthin scale- depend structures: beams, plates and shells.

10.45–11.30 **S. Bordas, L. Beex, E. Atroshchenko, K. Miller, P. Kerfriden.** Adaptive multi-scale methods for fracture, CAD, image as a model and digital twins.

#### 11.30–11.50 COFFEE BREAK

#### 11.50–13.10 ENGINEERING DYNAMICS OF STRUCTURES IN INTERACTION WITH SOLIDS, FLUIDS AND MOVING LOADS – I

*Chair: A.V. Metrikine.*

11.50–12.10 **E. Lourens, T.S. Nord, O. Øiseth.** Ice load identification on the Nordströmsgrund lighthouse.

12.10–12.30 **J.M. de Oliviera Barbosa, W.G. Versteijlen, K.N. van Dalen, A.V. Metrikine.** Method for extracting equivalent Winkler model of a 3D dynamic soil-structure interaction model for large-diameter offshore monopile foundations

12.30–12.50 **A. Tsouvalas, A.V. Metrikine.** Structure-borne wave radiation generated by offshore pile driving.

12.50–13.10 **J.S. Hoving, A.V. Metrikine.** A mixed time-frequency domain method to describe the non-smooth dynamic behaviour of a nonlinear medium bounded by a linear continuum.

#### LUNCH BREAK

#### 14.50–16.50 ENGINEERING DYNAMICS OF STRUCTURES IN INTERACTION WITH SOLIDS, FLUIDS AND MOVING LOADS – II

*Chair: A.V. Metrikine.*

14.50–15.10 **S.N. Gavrilov.** The paradox of a discontinuous trajectory for a mass particle moving along a string revisited.

15.10–15.30 **T. Lu, A.V. Metrikine.** On the existence of a critical speed of a rotating ring under a stationary point load.

15.30–15.50 **C. Keijdener, A.V. Metrikine.** A simple discrete element model of a dynamic geometrically nonlinear Timoshenko beam.

15.50–16.10 **A. Jarquin Laguna, A. Tsouvalas.** A semi-analytical impulse response method for transient laminar flow in hydraulic networks.

16.10–16.30 **J. Barbosa, Y. Qu, E.M. Lourens, A.V. Metrikine.** Influence of a plane boundary on the response of a freely vibrating cylinder in uniform flow.

16.30–16.50 **R. van Vliet, A.V. Metrikine.** Derivation and validation of a discrete model for a vibrating plate, based on Mindlin-Reissner theory.

#### 16.50–17.10 COFFEE BREAK

#### 17.10–18.10 ENGINEERING DYNAMICS OF STRUCTURES IN INTERACTION WITH SOLIDS, FLUIDS AND MOVING LOADS – III

*Chair: A.V. Metrikine.*

17.10–17.30 **P. van der Male, K.N. van Dalen, A.V. Metrikine.** Simulated nonlinear aerodynamic excitation of a rotating aerofoil.

17.30–17.50 **M. Zhao, K.N. Van Dalen, A.V. Metrikine.** 3D scattering of seismic waves at a cylindrical cavity in an elastic half space.

17.50–18.10 **F.W. Renting, K.N. van Dalen, J.M. de Oliveira Barbosa, A.V. Metrikine.** Interaction of a 2-D acoustic waveguide and an Euler-Bernoulli beam.

### BANQUET

## Day 3 – Wednesday, June 24

### ROOM II

#### 11.50–13.10 FLUID AND GAS

*Chair: S.A. Chivilikhin.*

11.50–12.10 **E.V. Prozorova.** Influence the effects of delay and dispersion in mechanics.

12.10–12.30 **D.V. Voronin.** Modeling of the flow ignition in a planar vortex chamber.

12.30–12.50 **I.K. Marchevsky, S.R. Grechkin-Pogrebnyakov.** Vortex element method adaptation for flow numerical simulation using GPU.

12.50–13.10 **S.A. Chivilikhin, P.A. Pavutets.** The calculation of planar stokes flow with free boundary in homobaric approximation.

#### LUNCH BREAK

#### 15.00–16.50 COMPUTATIONAL MECHANICS – I

*Chair: I.A. Brigadnov.*

15.00–15.30 Key-note lecture. **A. Schiavone, L.G. Zhao.** Modelling of stent deployment and deformation in diseased arteries by considering vessel anisotropy.

15.30–15.50 **A. Le-Zaharov.** A study of thermal conductivity in crystal structures using particle dynamics approach.

15.50–16.10 **E.Yu. Vitokhin.** Numerical analysis of temperature distribution in a layer heated by the short laser impulse with regard to a heat flux relaxation constant.

16.10–16.30 **V.F. Nikitin, N.N. Smirnov.** Computation of hydrogen-air mixture detonation with OpenMP multiprocessing on a supercomputer.

16.30–16.50 **V.D. Sulimov, N.N. Smirnov.** Hybrid global optimization for computational diagnostics of hydromechanical system.

#### 16.50–17.10 COFFEE BREAK

#### 17.10–18.30 COMPUTATIONAL MECHANICS – II

*Chair: L.G. Zhao.*

17.10–17.30 **I.A. Brigadnov.** Engineering estimation of bearing capacity of solids.

17.30–17.50 **A.V. Zaitsev, I.Yu. Zoubko, O.Yu. Isaev, D. V. Smirnov, I. A. Sudakov.** Inelastic Deformation of Flexible Graphite O-Ring Seals and Seal Packs under their Exploitation in Stop Valves.

17.50–18.10 **N. Kazarinov, V. Bratov, Y. Petrov, L. Witek, A. Bednarz.** Numerical simulation of ceramic plate penetration by cylindrical plunger.

18.10–18.30 **A.I. Dmitriev, W. Österle.** Possible impact of nanoparticles on polymer matrix properties.

#### BANQUET

## Day 4 –Thursday, June 25

### ROOM I

#### 10.00–11.30 **PLENARY LECTURES – V**

*Chair: V.A. Kuzkin.*

10.00–10.45 **T. Shimada, T. Kitamura.** Multi-physics properties in low dimensional Ferroic nanostructures from quantum-mechanics calculations.

10.45–11.30 **A.M. Linkov, L. Rybarska-Rusinek.** Numerical simulation of seismicity induced by mining.

#### 11.30–11.50 **COFFEE BREAK**

#### 11.50–13.20 **PLENARY LECTURES – VI**

*Chair: E. Pavlovskaja.*

11.50–12.35 **V.A. Levin, T.A. Zhuravskaya.** Detonation stabilization in a supersonic flow of a gas mixture in the channel of a special shape without any energy input.

12.35–13.20 **P. O'Brien.** From Fundamental Research to Commercial Reality.

### LUNCH BREAK

#### 14.40–16.10 **MECHANICAL AND CIVIL ENGINEERING APPLICATIONS – I**

*Chair: R.A. Arutyunyan.*

14.40–15.10 Key-note lecture. **E. Pavlovskaja, A. Postnikov, M. Wiercigroch.** Modelling of vortex induced vibrations.

15.10–15.30 **B.E. Melnikov.** Mean stress evolution in irregular cyclic loading of aluminium alloy.

15.30–15.50 **S.V. Petinov.** Aspects of fatigue crack growth assessment.

15.50–16.10 **I. Smirnov, G. Volkov, Yu Petrov, L. Witek, A. Bednarz, N. Kazarinov.** Threshold erosion fracture of aero engine blades.

#### 16.10–16.30 **COFFEE BREAK**

#### 16.30–17.50 **MECHANICAL AND CIVIL ENGINEERING APPLICATIONS – II**

*Chair: S.V. Petinov.*

16.30–16.50 **R.A. Arutyunyan.** High temperature damage and creep fracture of metallic materials.

16.50–17.10 **V.F. Koshelev, B.Z. Amusin.** A method of back analysis for rock mass inelastic parameters estimation.

17.10–17.30 **M.G. Zeitlin, A.N. Fedorova.** From Localization to Zoo of Patterns in Complex Dynamics of Ensembles.

17.30–17.50 **A.N. Fedorova, M.G. Zeitlin.** Fast Modeling for Collective Models of Beam/PlasmaPhysics.

### SPORT ACTIVITIES

## Day 4 –Thursday, June 25

### ROOM II

#### 14.50–16.10 NANO- AND MICROMECHANICS - I

*Chair: O.S. Loboda.*

14.50–15.10 **I.E. Berinskii**, A.Yu. Panchenko, E.A. Podolskaya. Modeling of elastic properties of molybdenum disulfide using a torque interaction potential.

15.10–15.30 **B.E. Abali**, W.H. Müller, V.A. Eremeyev. Numerical investigation of thin films with strain gradient elasticity.

15.30–15.50 *F. Ruiz-Botello*, **A. Castellanos**, E.F. Grekova, M.A.S. Quintanilla, V. Tourmat. Sound propagation in fine magnetic powders: effect of the magnetic field in the assembling procedure.

15.50–16.10 *O.V. Privalova*, L.V. Shtukin, **D.Yu. Skubov**. Nonlinear dynamics of nano-mechanical systems in quasi-stationary electromagnetic fields.

#### 16.10–16.30 COFFEE BREAK

#### 16.30–17.50 NANO- AND MICROMECHANICS – II

*Chair: I.E. Berinskii.*

16.30–16.50 **M.A. Grekov**, S.A. Kostyrko, Yu.I. Vikulina. Effect of surface and interface roughness at the nanoscale.

16.50–17.10 **S. Melin**, P. Hansson. Indentation at the atomic scale.

17.10–17.30 **S.V. Bobylev**, I.A. Ovid'ko. Plastic deformation modes mediated by grain boundaries in nanomaterials.

17.30–17.50 **M.V. Simonov**, A.M. Krivtsov. Energy oscillations in a harmonic one dimensional crystal.

### SPORT ACTIVITIES

## Day 5 –Friday, June 26

### ROOM I

#### 10.00–11.30 **PLENARY LECTURES – VII**

*Chair: V.I. Erofeev.*

10.00–10.45 **A. Corigliano.** Non-linear mechanics and numerical simulations in microsystems: recent advances and applications.

10.45–11.30 **A.V. Porubov.** Localized nonlinear waves in lattices: modeling, generation and control.

#### 11.30–11.50 **COFFEE BREAK**

#### 11.50–13.20 **PLENARY LECTURES – VIII**

*Chair: S. Rudykh.*

11.50–12.35 **F. dell'Isola.** Microstructured n-th gradient continuum models and some applications.

12.35–13.20 **E.F. Grekova.** A class of continuous acoustic metamaterials.

### **LUNCH BREAK**

#### 14.15–16.00 **CONTINUUM PHYSICS AND DISCRETE MECHANICS APPLIED TO ASTROPHYSICAL PHENOMENA – I**

*Chair: A.M. Krivtsov.*

14.15–15.00 **W.H. Müller, W.Weiss.** Large strain theory applied to self-gravitating bodies: A numerical Lagrangian approach.

15.00–15.20 **P. Lofink, W.H. Müller.** Finite Element investigations of the gravitational and rotational deformation of the Earth.

15.20–15.40 **F. Reich, W.H. Müller.** A review of electrodynamics and its coupling with classical balance equations by means of continuum mechanics.

15.40–16.00 **S. Glane, F. Reich, W.H. Müller.** Kinematic fluid dynamos examined by toroidal-poloidal decompositions - An example of combining continuum mechanics and electrodynamic field theory.

#### 16.00–16.20 **COFFEE BREAK**

#### 16.20–18.00 **CONTINUUM PHYSICS AND DISCRETE MECHANICS APPLIED TO ASTROPHYSICAL PHENOMENA – II**

*Chair: W.H. Müller.*

16.20–16.50 **A.M. Krivtsov.** Origin of Earth – Moon system: dynamical and evolutionary consideration.

16.50–17.20 **E.N. Slyuta.** Mechanical problems related to the lunar program.

17.20–17.40 **O.V. Trifonov, A.G. Tuchin, D.A. Tuchin, V.S. Yaroshevsky.** Hardware-In-The-Loop Modeling system of flight control of the spacecraft "Luna-Glob" at the stage of the automatic landing on the Moon.

17.40–18.00 **A.S. Murachev.** Equilibrium dust and gas clouds with evaporable particles.

### **18.00 CLOSING CEREMONY**



**Day 5 –Friday, June 26**

**ROOM II**

14.20–16.00 **WAVE MOTION**

*Chair: A.V. Porubov.*

14.20–14.40 **V.I. Erofeev.** Nonlinear localized deformation waves in the continuum with internal oscillatory degrees of freedom.

14.40–15.00 **Yu. I. Meshcheryakov.** Multiscale relaxation in steady shock wave.

15.00–15.20 **M. G. Zhuchkova, D. P. Kouzov.** The effect of a fluid stratification on the low frequency vibrations of a semi-infinite floating elastic plate interfaced with a rigid vertical wall.

15.20–15.40 **I.E. Keller.** Some new types of unstable generalized-viscous media.

15.40–16.00 **M.V. Wilde.** A cylindrical surface wave in a half-space with mixed boundary conditions on its surface.

**Day 6 – Saturday, June 27**

**EXCURSION**