

University	Peter the Great St. Petersburg Polytechnic University
Level of English proficiency	Fluent
Courses and fields of studies offered for applicants	1.1.7 Theoretical mechanics, machine dynamics 1.1.8 Mechanics of deformable solids 1.2.2 Mathematical modeling, numerical methods and software packages
Projects for potential academic supervision	<p>1. The Forty-eighth International Summer School “Advanced Problems in Mechanics”, Russian Foundation for Basic Research, 20-01-20014, 2020-2020, Principle investigator.</p> <p>2. The development of transition to thermal equilibrium analytical description methods in ideal crystals with complicated structure. Russian Foundation for Basic Research, 19-01-00633, 2019-2021. Principle investigator.</p> <p>3. Development of mathematical models and software for description of non-stationary thermal processes in crystalline materials with low defect concentration. Russian Science Foundation, 18-11-00201, 2018-2020. Principle investigator.</p> <p>4. Development of applied software tools for planning and monitoring hydraulic fracturing operations to increase oil and gas production efficiency. Ministry of Science and Higher Education, 14.575.21.0146, 2017-2019. Principle investigator.</p> <p>5. Development of complex software for modeling, optimization and control of hydraulic fracturing operations in the conditions of deposits of hard-to-recover reserves. Ministry of Science and Higher Education, 14.581.21.0027, 2017-2019. Principle investigator.</p> <p>6. Development of mathematical models and software tools for super computer aided kern simulation using supercomputers. Russian Foundation for Basic Research, 16-29-15121, 2016-2018. Principle investigator.</p> <p>7. Development of mathematical methods and software tools for predictive real-time modeling of multiple hydraulic fracturing to increase efficiency of heavy oil production. Russian Science Foundation, 15-11-00017, 2015-2016. Principle investigator A.M. Linkov.</p> <p>8. Development of analytical approaches and efficient computer algorithms for simulation of physical properties of carbon nanostructures using high performance computers. Russian Science Foundation, 14-11-00599, 2014 – 2016. Principle investigator.</p> <p>9. Development of the theoretical and experimental models of the dynamics of the solid nanostructures in the electromechanical fields. Russian Foundation for Basic Research, № 14-01-00845_a, 2014 – 2016. Principle investigator D.A. Indeitsev.</p> <p>10. Development of discrete and continuum methods for modeling of physical and mechanical processes in condensed matter at different scale levels taking into account rotational</p>

	<p>degrees of freedom. Russian Foundation for Basic Research, 14-01-00802_a. Russia, 2014 – 2016. Principle investigator.</p> <p>11. Theoretical and experimental investigations of Si-doped cavitation nanodiamonds with size control. Russian Foundation for Basic Research, 14-03-00625_a, 2014 – 2015. Principle investigator E.M. Galimov.</p> <p>12. Development of high performance algorithms and mathematical models for coke formation in cooling system of liquid-propellant rocket engines. Russian Foundation for Basic Research, 13-01-12076-ofi_m-2013-2015. Principle investigator.</p>
<p>Topics offered for prospective researches</p>	<p>Analytical and computer models of nonequilibrium thermal processes in ultrapure crystals</p>
<div data-bbox="172 658 552 1102" data-label="Image"> </div> <p>Research supervisor: Anton M. Krivtsov, Doctor of Science in Physics and Mathematics (Institute for Problems in Mechanical Engineering of Russian Academy of Sciences (IPME RAS))</p>	<p style="text-align: center;"><i>Mechanics</i></p> <p>Supervisor's research interests</p> <ul style="list-style-type: none"> <li>- Mechanics of media with microstructure</li> <li>- Continuum mechanics,</li> <li>- Nanomechanics,</li> <li>- Geomechanics,</li> <li>- Linear and Nonlinear oscillations,</li> <li>- Multibody dynamics,</li> <li>- Dynamics of centrifuges,</li> <li>- Percussive drilling,</li> <li>- Astrophysics,</li> <li>- Particle and molecular dynamics,</li> <li>- Computer methods in mechanics.</li> </ul> <p>Study program highlights Mechanics at the interface with other fields of science</p> <p>Supervisor's specific requirements:</p> <ul style="list-style-type: none"> <li>- Practical experience in research activities</li> <li>- Fundamental knowledge in the general fields of mathematics and mechanics,</li> <li>- Expertise in modern computational methods and information technology</li> <li>- Programming skills in C ++ and/or C # and/or JavaScript and/or Python</li> </ul> <p>Сведения о публикациях потенциального научного руководителя:</p> <ol style="list-style-type: none"> <li>1. Porubov, A.V., Krivtsov, A.M. Modeling of Nonlinear Sea Wave Modulation in the Presence of Ice Coverage. <i>Mathematics</i>, 2023, 11(23), 4805</li> <li>2. Dmitriev, S.V., Kuzkin, V.A., Krivtsov, A.M. Nonequilibrium thermal rectification at the junction of harmonic chains. <i>Physical Review E.</i>, 2023, 108(5), 054221</li> <li>3. Lapin, R.L., Kuzkin, V.A., Krivtsov, A.M. Quasi-static crack growth in three-layer media: a numerical experiment. <i>Letters on Materials</i>, 2023, 13(3), страницы 272–277</li> <li>4. J. A. Baimova, N.M. Bessonov, A.M. Krivtsov. (2023) Motion</li> </ol>

	<p>of localized disturbances in scalar harmonic lattices. Physical review e 107(6). DOI: 10.1103/PhysRevE.107.065002 Q1</p> <p>5. A.M. Krivtsov. (2022) Dynamics of matter and energy. Zeitschrift fur Angewandte Mathematik und Mechanik. DOI: 10.1002/zamm.202100496</p>
	<p>The results of intellectual activity</p> <p>1. 2021610278 (12.01.2021) A program for modeling ballistic heat propagation in a one-dimensional harmonic crystal by the method of molecular dynamics.</p> <p>2. 2021681617 (23.12.2021) A program for modeling the time variation of a sinusoidal temperature field in a one-dimensional anharmonic crystal with an attached mass.</p> <p>3. 2021681618 (23.12.2021) A program for modeling heat propagation in a one-dimensional semi-infinite harmonic crystal with an initial rectangular thermal disturbance.</p> <p>4. 2021681991 (28.12.2021) A program for calculating the amplitudes of sinusoidal temperature fields in a one-dimensional harmonic crystal with an attached mass</p> <p>5. 2021682071 (29.12.2021) One Proof Program</p> <p>6. 2021681514 (23.12.2021) A program for modeling the propagation of heat in a semi-infinite Hooke chain with a sudden point supply of thermal energy</p>