INVESTIGATION OF WAVE PHENOMENA USING COMPUTATIONAL EXPERIMENTS

Moscow Institute of Physics and Technology (National Research University)

Degree or qualification is awarded: **PhD (Candidate of Science)**

Language of study: **English**
Mode of study: **full-time**
Duration: **4 years**
Availability of free education: **yes**
Price: **375 000 RUB**

Programme webpage at the university website:
https://eng.mipt.ru/programs/investigation-of-wave-phenomena-using-computational-experiments/

Programme curator: **Denis Ustyuzhaninov**
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E-mail: interadmission@phystech.edu

Entry requirements:

- Master's degree / equivalent in a related field
- B2 level of English
- Good track record of publications related to the topic of the intended research
- Strong research proposal 1,500 - 3,500 words

Research supervisor:
Alena Favorskaya
PhD, DSc

Supervisor's research interests:
The study of solutions of the boundary value problem of elastic and acoustic wave equations using the author's method, based on a combination of analytical approaches and computational experiments. The development of numerical methods for solving this boundary-value problem, primarily from the family of grid-characteristic ones.
Research highlights:

- Possible financial support for graduate student.
- Possible publications in top rated journals.
- Possible payment of trips and reports at international conferences.

Supervisor's specific requirements:

- **Mandatory disciplines:**
  - Computational Mathematics.
  - Tensor Calculus.
  - Software development (C ++, Python).
  - High-performance computer systems (user's experience, parallel programming).
- **Desired Disciplines:**

- Geophysics, Seismic Prospecting.
- Inverse Problems.
- Migration.
- Ultrasonic non-destructive testing.

Main publications:

- Favorskaya, A.V., Zhdanov, M.S., Khokhlov, N.I., Petrov, I.B. Modelling the wave phenomena in acoustic and elastic media with sharp variations of physical properties using the grid-characteristic method (2018) Geophysical Prospecting, 66 (8), pp. 1485-1502.
- Favorskaya, A.V., Petrov, I.B. A novel method for investigation of acoustic and elastic wave phenomena using numerical experiments (2020)Theoretical & Applied Mechanics Letters, in print.
- Favorskaya, A. A novel method for wave phenomena investigation (2019) Procedia Computer Science, 159, pp. 1208-1215.
- Favorskaya, A.V. Elastic wave scattering on a gasfilled fracture perpendicular to plane P-wave front (2020) Systems and Technologies, 173, pp. 213-224.
- Favorskaya, A.V., Petrov, I.B. The Use of Full-Wave Numerical Simulation for the Investigation of Fractured Zones (2019) Mathematical Models and Computer Simulations, 11 (4), pp. 518-530.
- Petrov, I.B., Favorskaya, A.V., Khokhlov, N.I. Gridcharacteristic method on embedded hierarchical grids and its application in the study of seismic waves (2017) Computational Mathematics and Mathematical Physics, 57 (11), pp. 1771-1777.

Specializations within this programme