SINGULARITIES OF DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS

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:
Duration: **4 years**
Availability of free education: **yes**
Price: **375 000 RUB**

Programme webpage at the university website:
https://eng.mipt.ru/programs/singularities-of-differential-equations-and-their-applications/

Programme curator: **Denis Ustyuzhaninov**
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Research supervisor:
Alexey Remizov
PhD

Supervisor's research interests:

Singularities of ordinary differential equations in various fields, including differential geometry, calculus of variations, optimal control theory, dynamical systems, physics (singular Lagrangians), etc. Related interests: geometry of vision, image reconstruction (inpainting), history of differential equations and differential geometry.

Research highlights:

Collaboration with foreign scientists and research centers. For singularities of ordinary differential equations and differential geometry: University of Liverpool (UK), University of Sao Paolo (Brazil), several research centers in Japan (Kyoto, Sapporo). For image reconstruction: France (Ecole Polytechnique, Sorbonne University, University of Toulon). We permanently apply for grants.

Supervisor's specific requirements:

- Strictly necessary for all topics: calculus, linear algebra, ordinary differential equations.
- For image reconstruction: + programming skills.
- For history of mathematics: + foreign languages (English, French, German).

Main publications:

- N. G. Pavlova, A. O. Remizov, Completion of the classification of generic singularities of geodesic flows in two classes of metrics, Izv. Math., 83:1 (2019), 104–123.
- O. Remizov, F. Tari, Singularities of the geodesic flow on surfaces with pseudo-Riemannian metrics, Geometriae Dedicata, 185:1 (2016), 131–153.
- O. Remizov, On the local and global properties of geodesics in pseudo-Riemannian metrics, Differ. Geom. Appl., 39 (2015), 36–58.
- U. Boscain, R.A. Chertovskih, J.P. Gauthier, D. Prandi, A.O. Remizov, Highly Corrupted Image Inpainting Through Hypoelliptic Diffusion, J. Math. Imaging Vis., 60:8 (2018), 1231–1245.
- U. Boscain, R.A. Chertovskih, J.P. Gauthier, A.O. Remizov, Hypoelliptic diffusion and human vision: a semidiscrete new twist, SIAM J. Imaging Sci., 7:2 (2014), 669–698.
- I.R. Shafarevich, A.O. Remizov, Linear Algebra and Geometry, Springer, Heidelberg, 2013, xxii+526 pp.

Specializations within this programme