# NONLINEAR WAVE STRUCTURES IN PHYSICAL, CHEMICAL AND BIOLOGICAL SYSTEMS

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 curator: **Denis Ustyuzhaninov**
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**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:**
Vladimir Gubernov
PhD, DSc

**Supervisor's research interests:**
Nonlinear waves:

- Stability, dynamics and interaction of the solitary waves and fronts; Evans function method, combustion waves, waves in chemical reactions, solitons in Bose-Einstein condensate.

Chaotic dynamics:

- Chaos in radiophysics, chaotic dynamics of nonlinear waves.

Biophysics:

- Turing and non-Turing mechanisms of pattern formation; modeling of self-organization in biological and chemical systems; tumor growth.

Combustion waves:

- Instabilities in combustion, combustion waves and pattern formation in premixed and diffusion flames.

**Research highlights:**

- The currently open research topics are focused on asymptotic and numerical analysis of nonlinear waves in combustion systems. There is an opportunity to work in the field of experimental studies of flame structure and dynamics including laser diagnostics of reacting flows. Close collaboration with the world's leading research groups is expected.

**Supervisor’s specific requirements:**

- Bachelor or Masters degree in Applied Mathematics, Nonlinear physics, Laser physics, Combustion, Numerical Modelling.
- Fluent English.

**Main publications:**


- Yakupov E. O., Gubernov V. V., Polezhaev A. A. Mathematical modeling of spatiotemporal patterns formed at a traveling reaction front //Chaos. – 2020. – Т. 30. – №. 8. – С. 083147.
- Nechipurenko S. et al. Experimental observation of diffusive-thermal oscillations of burner stabilized methane-air flames //Combustion and Flame. – 2020. – Т. 213. – pp. 202-210.
- Gubernov V. V., Bykov V., Maas U. Hydrogen/air burner-stabilized flames at elevated pressures // Combustion and Flame. – 2017. – Т. 185. – pp. 44-52._


## Specializations within this programme