Department of Instrumentation

Numerical Lyapunov analysis of chaotic dynamics
Duration: 14 days

Supervisor: Professor Pavel Kuptsov

e-mail: p.kuptsov@sstu.ru

Language of training: English

Audience: graduate students, undergraduates and postdocs interesting in numerical methods of nonlinear dynamics

The goal of the internship is studying of basic theory and practical methods of contemporary Lyapunov analysis of chaotic dynamical systems. These methods include computation of Lyapunov exponents, finite-time Lyapunov exponents, covariant Lyapunov vectors, angles between stable, neutral and unstable trajectory manifolds.

The result of the internship is mastering of practical numerical algorithms for revealing subtle properties of chaotic dynamics.

Admission requirements:
basics of linear algebra, skills in programming.

Research topics:
1. Theory and standard algorithm for Lyapunov exponents;
2. Theory of covariant Lyapunov vectors and methods of their computation;
3. Computations of angles between unstable, neutral and stable trajectory manifolds;
4. Testing of hyperbolicity and pseudohyperbolicity of chaotic attractors;
5. Types of finite-time Lyapunov exponents and their computation.