Course: Stability theory of stochastic differential equations

Teacher(s): Miljana Jovanović, Marija Milošević

Course status: elective

ECTS: 12

Prerequisites: -

Goal

Students will get acquainted with stability theory of stochastic differential equations, as well as with significance of this area in the applications, primarily in population dynamics, physics and finance.

Outcomes

Students will be able to examine stability of various types of stochastic differential equations.

Contents

Theoretical teaching

- Stability of solutions to stochastic differential equations in probability, almost sure stability.
- Stochastic version of Lyapunov stability theory. Lyapunov function.
- Exponential stability: almost sure stability and p-th moment stability.
- Stochastic stabilization and destabilization.
- Convergence and stability of numerical Euler-Maruyama method of approximation of solutions to stochastic differential equations.
- Convergence and stability of numerical backward Euler method of approximation of solutions to stochastic differential equations.
- Some numerical methods, their comparison and choice of the adequate method according to different criteria.

Practical teaching

Implementation of the theoretically analyzed methods, numerical simulations.

Recommended bibliography

1. X. Mao, Stochastic Differential Equations and their Applications, Horwood Publishing Chichester, 2007.
2. X. Mao, Exponential Stability of Stochastic Differential Equations and their Applications, Marcel Dekker, 1994.
3. P. E. Kloeden, E. Platen, Numerical solution of stochastic differential equations, Springer, Berlin, Heidelberg, 1999.

Active teaching hours:	Theoretical: 4	Practical:

Methods of teaching

Theoretical lectures and independent work of students during practical hours.

Knowledge estimation: (max 100 points)

50 points on pre-exam and 50 points on oral exam