ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

Invitation to the Doctoral Seminar

Dr. Maximilian Engel

FU Berlin

“Computer-assisted proofs for stochastic bifurcation problems”

HS 7 | Wednesday, 18 October 2023 | 10:00 a.m.

Abstract

We will discuss how to prove bifurcations from synchronization to chaos in stochastic oscillators via rigorous estimates on the corresponding dominant Lyapunov exponents. The key difficulty is to show the main chaotic property, a positive Lyapunov exponent, which we solve via a computer-assisted proof. Using the recently developed theory of conditioned Lyapunov exponents on bounded domains and the modified Furstenberg–Khasminskii formula, the problem boils down to the rigorous computation of eigenfunctions of the Kolmogorov operators describing distributions of the underlying stochastic process. Additionally, we will demonstrate how to deploy new computer-assisted methods to rigorously compute also moment Lyapunov exponents that yield asymptotic statistics around the dominant Lyapunov exponent and help to detect even more subtle stochastic bifurcation behavior.

Iryna Vasylieva and the Department of Mathematics look forward to seeing you at the talk!