

Oberseminar

Numerik

Frau Prof. Alina Chertock

(North Carolina State University, Raleigh, USA)

22.11.24

15:00 Uhr

Hilbertraum (05-432), Staudingerweg 9, 55128 Mainz

„Navigating Uncertainty: Stochastic Methods for Nonlinear Systems and the Women Leading the Way“

Abstract:

Many important scientific problems involve several sources of uncertainties, such as model parameters and initial and boundary conditions. Quantifying these uncertainties is essential for many applications since it helps to conduct sensitivity analysis and provides guidance for improving the models. The design of reliable numerical methods for models with uncertainties has seen a lot of activity lately. One of the most popular methods is Monte Carlo-type simulations, which are generally good but inefficient due to the large number of realizations required. In addition to Monte Carlo methods, a widely used approach for solving partial differential equations with uncertainties is the generalized polynomial chaos (gPC), where stochastic processes are represented in terms of orthogonal polynomials series of random variables. It is well-known that gPC-based methods, which are spectral-type methods, exhibit fast convergence when the solution depends smoothly on random parameters. However, their application to nonlinear systems of conservation/balance laws still encounters some significant difficulties. The latter is related to the presence of discontinuities that may develop in numerical solutions in finite time, triggering the appearance of aliasing errors and Gibbs-type phenomena. This talk will provide an overview of numerical methods for models with uncertainties and explore strategies to address the challenges encountered when applying these methods to nonlinear hyperbolic systems of conservation and balance laws.

Ab 14:15 Uhr gibt es Kaffee/Tee und Kuchen

Um 15:00 Uhr wird mit einer musikalischen Einführung von Nathalie Hoyer (Gesang & Kontrabass) und Kai Werth (Piano & Gesang) begonnen.

Hierzu sind alle herzlich eingeladen.

AG Numerik

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