

Save the date
January 5, 7, 12, 14
15:00



MATH+ Distinguished Visiting Scholar

Prof. Dr. Rolf Krause

Online Lecture Series

Multilevel Strategies for Non-Linear Problems and Machine Learning

Rolf Krause, director of the Institute for Computational Science at the Università della Svizzera italiana is an internationally renowned expert on advanced multilevel methods and parallel computation for real-world PDE problems.

He is joining MATH+ as Distinguished Visiting Scholar in winter 2020.

The lecture series provides the opportunity for MATH+ and BMS students and postdocs to learn about recent developments in multilevel methods.

Lectures will be given online on zoom.

Please register by mail to weiser@zib.de.

A zoom link will be provided a few days before the lectures to registered participants.

Multilevel Strategies for Non-Linear Problems and Machine Learning

On Non-Linear Preconditioning, Multilevel Optimization, and Multilevel Training

In this lecture series, we will discuss the main ideas of multilevel optimization techniques and their relation to classical multigrid theory. We will discuss how multilevel optimization methods for convex and non-convex minimization problems can be constructed and analyzed. We will study the significant gain in convergence speed, which can be achieved by multilevel minimization techniques.

Multilevel optimization techniques are also intimately linked to non-linear preconditioning. As it turns out, the minimization-based view on non-linear problems can not only help to design efficient preconditioners, but is also useful for the construction of globalization strategies.

In the last part of the lecture series, we will employ multilevel optimization techniques in the context of machine learning and will discuss their benefits for the training of neural networks. Various numerical examples from phase field models for fracture, from non-linear elasticity, cardiac simulation, and from deep learning will illustrate our findings.

Four lectures in January at 15:00 CET

Tuesday 5, Thursday 7
Tuesday 12, Thursday 14