Einladung zum Oberseminar Wissenschaftliches Rechnen

Julius-Maximilians-Universität Würzburg
Lehrstuhl für Wissenschaftliches Rechnen IX

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Recent Developments in Numerical Linear Algebra for PDE-Constrained Optimization Problems

Optimization problems subject to PDE constraints form a mathematical tool that can be applied to a wide range of scientific processes, including fluid flow control, medical imaging, option pricing, biological and chemical processes, and electromagnetic inverse problems, to name a few. These problems involve minimizing some function arising from a particular physical objective, while at the same time obeying a system of PDEs which describe the process. It is necessary to obtain accurate solutions to such problems within a reasonable CPU time, in particular for time-dependent problems, for which the "all-at-once" solution can lead to extremely large linear systems.

In this talk we will consider iterative methods, in particular Krylov subspace methods, to solve such systems, accelerated by fast and robust preconditioning strategies. In particular, we will survey several new developments, including block preconditioners for fluid flow control problems, a circulant preconditioning framework for solving certain optimization problems constrained by fractional differential equations, and multiple saddle-point preconditioners for block tridiagonal linear systems. We will illustrate the benefit of using these new approaches through a range of numerical experiments.

This talk is based on work with Santolo Leveque (Scuola Normale Superiore, Pisa), Spyros Pougkakiotis (University of Dundee), Jacek Gondzio (University of Edinburgh), and Andreas Potschka (TU Clausthal).

Ort: Raum 30.02.003 (Mathematik West, 2.Stock) Zeit: Mittwoch, 19.06.24, 10:00 Uhr

Zu diesem Vortrag laden wir Sie herzlich ein.
You are cordially invited to this lecture.

gez. Prof. Dr. Alfio Borzì
gez. Prof. Dr. Frank Werner