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## **SEMINAR OF NUMERICAL ANALYSIS**

➤ **WEDNESDAY 26 NOVEMBER 2014 - ROOM ME B3 31 - 16h15**

**Dr. Martin STOLL** (MPI Magdeburg, Germany) will present a seminar entitled:

### **“Preconditioners for time-dependent PDE-constrained optimization problems”**

**Abstract:**

With the advance of both computers and algorithms many previously studied partial differential equation models have become constraints in an optimization problem. The goal within this framework is to determine the configuration of the governing equations that best fits a desired state or observed measurements. Our aim for this talk is to introduce space-time discretizations that when treated in an all-at-once approach, where we solve for all unknowns in one step, lead to very large and sparse linear systems. These systems will be beyond the reach of any direct method and we therefore discuss preconditioning strategies that can be embedded into iterative solvers. We illustrate their performance on a number of different problems. One disadvantage of this approach is the large storage demand for the space-time vectors. In certain cases this drawback can be overcome by using low-rank techniques and our methods combine recent developments in preconditioning with state-of-the-art solvers for matrix equations.

This is joint work with Andy Wathen (Oxford), John Pearson (Edinburgh) and Tobias Breiten (Graz).

Lausanne, 16 October 2014/DK/cr