

All-at-once multigrid methods for Poisson and Stokes control problems

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ABSTRACT

In this talk we consider standard Poisson and Stokes control problems of tracking type. The optimality system (KKT system) characterising the solution of such a PDE-constrained optimisation problem is a large-scale sparse linear system. This system is symmetric but not positive definite. Therefore, standard iterative solvers are typically not the best choice.

We are interested in fast iteration schemes with convergence rates bounded away from 1 by a constant which is independent of the discretization parameter (the grid size) and of problem parameters, like in the regularization parameter in the model problem. To achieve this goal, we propose an all-at-once multigrid approach.

The main focus of the talk is on the convergence theory. We will introduce an abstract framework which allows to develop the convergence theory in a systematic way.