Block-diagonal preconditioning for optimal control problems constrained by PDEs with uncertain inputs

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Abstract

This talk is aimed at the efficient numerical simulation of optimization problems governed by either steady-state or unsteady partial differential equations involving random coefficients. This class of problems often leads to prohibitively high dimensional saddle point systems with Kronecker product structure, especially when discretized with the stochastic Galerkin finite element method. Here, we derive robust Schur complement-based preconditioners for solving the resulting stochastic optimality systems with all-at-once low-rank solvers. Moreover, we illustrate the effectiveness of our solvers with numerical experiments for the heat equation, the Stokes equations and the Stokes-Brinkman equations.

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