

## Talk announcement

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## Robust preconditioners for optimality systems - an infinite-dimensional perspective

In this talk we consider optimization problems in function space with objective functionals of tracking type and elliptic partial differential equations (PDEs) as constraints, like inverse problems for elliptic PDEs or optimal control problems with elliptic state equations. Such problems typically involve an additional regularization/cost term depending on a regularization/cost parameter.

The discretized optimality systems of such problems are typically ill-conditioned due to high-dimensional approximation spaces and/or small regularization/cost parameters. Preconditioners for these discretized optimality systems based on the concept of Schur complements have been frequently proposed in literature leading to robust convergence properties of associated preconditioned Krylov subspace methods.

We will show how to exploit this strategy already for the formulation of the optimality systems in function space, which naturally leads to alternative formulations of the elliptic PDE-constraint. Besides the usual weak form also the strong and the very weak form come into play. We discuss possible implications of this approach for preconditioning the discretized optimality systems..