

Adaptive Wavelet Methods for Control Problems Constrained by Parabolic PDEs

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Optimization problems constrained by partial differential equations (PDEs) are particularly challenging from a computational point of view: the first order necessary conditions for optimality lead to a *coupled system* of PDEs. For these, adaptive methods which aim at distributing the available degrees of freedom in an a-posteriori-fashion to capture singularities in the data or domain appear to be most promising. For control problems constrained by a parabolic PDE, one needs to solve a system of PDEs coupled *globally in time*.

For such problems, an adaptive method based on wavelets is proposed. It builds on a recent paper by Schwab and Stevenson where a single linear parabolic evolution problem is formulated in a weak space-time form and where an adaptive wavelet method is designed for which optimal convergence rates can be shown.