# Adaptive Wavelet Methods for Linear-Quadratic Elliptic Control Problems

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The numerical solution of PDE-constrained control problems requires to repeatedly solve a system of PDEs for the involved variables (state, costate and control). Specifically constraints in form of a linear elliptic PDE with the practically most relevant case of a Dirichlet boundary control are considered, which are formulated as a saddle point problem. In addition, inequality constraints on the control may be posed.

The proposed numerical solution scheme is based on wavelet expansions. Striving for efficiency and optimal complexity, I will address preconditioning issues, the selection of appropriate norms in the control functional, and adaptive methods for the resolution of singularities. An adaptive algorithm for the system of optimality conditions is presented, together with remarks on the convergence and convergence rates which yield asymptotically optimal results when compared to wavelet-best N-term approximations of the relevant variables. Also some numerical experiments are discussed.