

TITLE AND ABSTRACT

Title: Finite Element Analysis of Dirichlet Boundary Control Problems.

Abstract: We discuss second and fourth order energy space based Dirichlet control problems. We propose an alternative formulation which enables us to obtain a smoother optimal control, which in turn provides a better convergence rate for the discrete optimal control than earlier approaches.

In the first part we discuss conforming finite element analysis for the second order problem, where optimal order *a priori* error estimates are derived for the optimal control, optimal state and adjoint states in energy and L_2 norms. Subsequently a residual based reliable and efficient (locally) error estimators are derived for *a posteriori* error control.

In the second part we extend this alternative formulation for the fourth order problem. In this case the resulting optimality system is discretized using C^0 interior penalty method. We obtain an optimal order error estimate for the optimal control, optimal state and adjoint state in Energy and L_2 norms.

At the end we present numerical experiments which illustrate our theoretical findings.