A DPG METHOD FOR LINEAR QUADRATIC OPTIMAL CONTROL PROBLEMS

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ABSTRACT. The DPG method with optimal test functions for solving linear quadratic optimal control problems with control constraints is studied. We prove existence of a unique optimal solution of the nonlinear discrete problem and characterize it through first order optimality conditions. Furthermore, we systematically develop a priori as well as a posteriori error estimates. Our proposed method can be applied to a wide range of constrained optimal control problems subject to, e.g., scalar second-order PDEs and the Stokes equations. Numerical experiments that illustrate our theoretical findings are presented.

Keywords: optimal control, discontinuous Petrov–Galerkin method, optimal test functions, finite elements, convergence, error estimates.

Mathematics Subject Classifications (2010): 49J20, 49M25, 65N15, 65N30.

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