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Numerical approximation for Optimal control problems governed by elliptic equations.

In this talk, we present a numerical method solving optimal control problems governed by elliptic partial differential equations. When the objective functional involves the flux variable, least-squares(LS) approach based on a first-order system has advantages over other methods since the scalar(state) variable and its flux are simultaneously approximated. Our method is based on a least-squares approach solving first-order system of equations. Such a system of equations is obtained by applying the Lagrange multiplier rule. In most cases, this results in at least doubling the number of unknowns. Our approach increases the number of unknowns slightly. We provide optimal error estimates based on the L_2 norm appeared in the objective functional, not usual energy norm associated with the LS functional. (Received February 09, 2014)