

Substructuring-based Methods for Elliptic and Parabolic Optimal Control Problems

Mandal Bankin Chandra *
Indian Institute of technology Bhubaneswar
bmandal@iitbbs.ac.in

Abstract

We study Dirichlet-Neumann and Neumann-Neumann methods for the parallel solution of elliptic optimal control problems. Unlike in the case of single linear or non-linear elliptic problems, we need to solve here two coupled elliptic problems that arise as a part of optimality system for the optimal control problem. We present a rigorous convergence analysis for the case of two non-overlapping sub-domains, which shows that both methods converge in at most three iterations. We extend this idea with Dirichlet-Neumann and Neumann-Neumann wave-form relaxation methods for the parallel solution of linear-quadratic parabolic optimal control problems, originating from the examples of transient optimal heating with distributed control. We illustrate our findings with numerical results.