

Adaptive Frame Methods for Elliptic Operator Equations: The Steepest Descent Approach*

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Abstract

This paper is concerned with the development of adaptive numerical methods for elliptic operator equations. We are especially interested in discretization schemes based on wavelet frames. We show that by using three basic subroutines an implementable, convergent scheme can be derived, which, moreover, has optimal computational complexity. The scheme is based on adaptive steepest descent iterations. We illustrate our findings by numerical results for the computation of solutions of the Poisson equation with limited Sobolev smoothness on intervals in 1D and on L -shaped domains in 2D.

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