Minimum residual iteration for a dual–dual mixed formulation of exterior transmission problems

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Abstract

We investigate the minimum residual method for symmetric, indefinite linear systems of a so-called dual–dual structure. These systems arise when using a combined dual-mixed finite element method with a Dirichlet-to-Neumann mapping to solve a class of exterior transmission problems. As a model problem we consider an elliptic equation of divergence form coupled with the Laplace equation in an unbounded region of the plane. We give abstract convergence results for the preconditioned minimum residual method for the solution of linear systems of the special dual–dual structure. For our model problem, we show that this iterative method provides an efficient solution procedure where standard preconditioners can directly be used.