FEI CAO

Compatible Relaxation based Geometric-Algebraic Multigrid

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We develop compatible relaxation algorithms for smoothed aggregation-based multigrid coarsening. In the proposed method, we use the geometry of the given discrete problem on the finest level to coarsen the system together with compatible relaxation to from the sparsity structure of the interpolation operator and then apply energy minimization techniques to compute its entries. Of particular interest in this work is the idea to use a geometric coarsening algorithm based on a new more sharp variant of compatible relaxation. The proposed method is competitive with classical AMG in terms of its convergence properties for scalar anisotropic diffusion problems and allows explicit control of operator complexities. We present preliminary numerical experiments for a two-level scheme that demonstrate the potential of the proposed algorithm