Christian Ketelsen

A Least-Squares Approach to Disordered Physical Systems

5627 Poppy Ct
Golden CO 80403
christianketelsen@gmail.com
Steve McCormick
Tom Manteuffel
Geoff Sanders, James Brannick, Ludmil Zikatanov

Popular discretizations of disordered physical systems produce large matrices which are extremely ill conditioned, challenging even the most sophisticated iterative methods. For highly disordered background fields, the algebraically smooth error modes are not geometrically smooth in any sense, making the usual multilevel methods inadequate. We present a discretization of a simplified model problem based on a least-squares approach that eliminates some difficulties found in previous discretizations. We describe a solution technique for the resulting linear system based on smoothed aggregation multigrid and give numerical results. Extensions to higher-dimensional disordered physical systems are discussed.