Finite Element Multilevel Solvers: Experiences with Wavelet Techniques

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Abstract

In a first part, an elementary introduction to the concept of stable subspace splittings (in particular, those based on frames and Riesz bases), and its connection to the design of iterative solvers for large-scale discretizations of symmetric elliptic PDE boundary value problems is given.

In the second, main part, we specialize to the situation of hierarchies of finite element spaces and discuss examples of multilevel, wavelet-like schemes (mostly for second order elliptic operators and linear finite elements). Both a comparison of theoretical properties and the numerical evaluation of recent proposals by different authors will be presented.

Part of the results are joint work with R. Lorentz, and others. More details can be found in my recent publications on these topics (see the above www-address).