Carmen, C Rodrigo

Multicolor Fourier analysis of the multigrid method for quadratic FEM discretizations

Centro Universitario de la Defensa
Academia General Militar de Zaragoza
Ctra Huesca s/n
50090 Zaragoza
Spain
carmenr@unizar.es
Francisco Jos / F.J. Gaspar
Francisco Javier / F.J. Lisbona

To design geometric multigrid methods, Local Fourier Analysis (LFA) is a very useful tool. However, LFA for quadratic finite element discretizations can not be performed in a standard way, since the discrete operator is defined by different stencils depending on the location of the points in the grid. In this work, a multicolor local Fourier analysis is presented to analyze multigrid solvers for quadratic finite element discretizations. With the help of this analysis, a four-color smoother is designed, resulting very efficient for equilateral triangular grids. By other hand, for anisotropic meshes, a zebra-line smoother is proposed. Some results showing the good correspondence between the two-grid convergence factors predicted by the analysis and the experimentally computed asymptotic convergence factors are presented.