

Superconvergent Two-Grid Methods for Elliptic Eigenvalue Problems

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Abstract Some numerical algorithms for elliptic eigenvalue problems are proposed, analyzed, and numerically tested. The methods combine advantages of the two-grid algorithm (Xu and Zhou in *Math Comput* 70(233):17–25, 2001), the two-space method (Racheva and Andreev in *Comput Methods Appl Math* 2:171–185, 2002), the shifted inverse power method (Hu and Cheng in *Math Comput* 80:1287–1301, 2011; Yang and Bi in *SIAM J Numer Anal* 49:1602–1624, 2011), and the polynomial preserving recovery enhancing technique (Naga et al. in *SIAM J Sci Comput* 28:1289–1300, 2006). Our new algorithms compare favorably with some existing methods and enjoy superconvergence property.

Keywords Eigenvalue problems · Two-grid method · Gradient recovery · Superconvergence · Polynomial preserving · Adaptive

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