A SPECTRAL METHOD FOR THE EIGENVALUE PROBLEM FOR ELLIPTIC EQUATIONS[*]

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Abstract. Let Ω be an open, simply connected, and bounded region in $\mathbb{R}^d$, $d \geq 2$, and assume its boundary $\partial\Omega$ is smooth. Consider solving the eigenvalue problem $Lu = \lambda u$ for an elliptic partial differential operator L over Ω with zero values for either Dirichlet or Neumann boundary conditions. We propose, analyze, and illustrate a 'spectral method' for solving numerically such an eigenvalue problem. This is an extension of the methods presented earlier by Atkinson, Chien, and Hansen [Adv. Comput. Math, 33 (2010), pp. 169–189, and to appear].

Key words. elliptic equations, eigenvalue problem, spectral method, multivariable approximation

AMS subject classifications. 65M70

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