A Biorthogonal Wavelet Approach for Solving Boundary Value Problems

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Abstract

We will be concerned with the solution of an elliptic boundary value problem in one dimension with polynomial coefficients. In a Galerkin approach, we employ biorthogonal wavelets adapted to a differential operator with constant coefficients, and use the refinement equations to set up the system of linear equations with exact entries (up to round–off). For the solution of the linear equation, we construct a biorthogonal two–grid method with intergrid operators stemming from wavelet–type operators adapted to the problem.

Key Words: Adapted biorthogonal wavelets, boundary value problems, refinement equations, two–grid (multi–grid) methods.

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