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HARMONIC INTERPOLATING WAVELETS IN A RING

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Complementing the authors' earlier joint papers on the application of orthogonal wavelets to represent solutions of Dirichlet problems with the Laplace operator and its powers in a disk and a ring and of interpolating wavelets for the same problem in a disk, we develop a technique of applying interpolating periodic wavelets in a ring for the Dirichlet boundary value problem. The emphasis is not on the exact representation of the solution in the form of (double) series in a wavelet system but on the approximation of solutions with any given accuracy by finite linear combinations of dyadic rational translations of special harmonic polynomials; these combinations are constructed with the use of interpolating wavelets. The obtained approximation formulas are simply calculated, especially if the squared Fourier transform of the Meyer scaling function with the properties described in the paper is explicitly defined in terms of the corresponding elementary functions.

Keywords: interpolating wavelets, multiresolution analysis (MRA), Dirichlet problem, Laplace operator, best approximation, modulus of continuity.

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