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ORIGINAL PAPER

Numerical Solutions of Integral Equations Using Linear Legendre Multiwavelets

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Abstract
This paper presents a novel approach for solving Fredholm integral equations and Fredholm integro-differential equations using an operational matrix of integration based on linear Legendre multiwavelets. By employing this operational matrix, we transform the integral equations into a system of algebraic equations, significantly simplifying the solution process. To validate the effectiveness of our method, we solve several illustrative examples and provide graphical comparisons of approximate solutions against exact solutions. Additionally, we conduct a comparative analysis of our results with those obtained using the Wilson wavelet method and the Cosine and Sine wavelet method, which are presented in tabular form. The results demonstrate that the proposed method not only enhances accuracy but also improves computational efficiency in solving these complex equations.

Keywords Linear Legendre multiwavelets · Operational matrix of integration · Integral equations

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