APPLICATION OF HAAR WAVELETS IN SOLVING NONLINEAR FRACTIONAL FREDHOLM INTEGRO-DIFFERENTIAL EQUATIONS

A novel and effective method based on Haar wavelets and Block Pulse Functions (BPFs) is proposed to solve nonlinear Fredholm integro-differential equations of fractional order. The operational matrix of Haar wavelets via BPFs is derived and together with Haar wavelet operational matrix of fractional integration are used to transform the mentioned equation to a system of algebraic equations. Our new method is based on this matrix and the vector forms for representation of Haar wavelets. In addition, an error and convergence analysis of the Haar approximation is discussed. Since this approach does not need any integration, all calculations would be easily implemented, and it has several advantages in reducing the computational burden. Some examples are included to demonstrate the validity and applicability of the technique.

Fredholm integro-differential equations, Haar wavelets, Operational matrix, Fractional calculus, Block Pulse Functions


کلمات کلیدی:

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