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Summary: The second-kind Chebyshev wavelets collocation method is applied for solving a class of time-fractional diffusion-wave equation. Fractional integral formula of a single Chebyshev wavelet in the Riemann-Liouville sense is derived by means of shifted Chebyshev polynomials of the second kind. Moreover, convergence and accuracy estimation of the second-kind Chebyshev wavelets expansion of two dimensions are given. During the process of establishing the expression of the solution, all the initial and boundary conditions are taken into account automatically, which is very convenient for solving the problem under consideration. Based on the collocation technique, the second-kind Chebyshev wavelets are used to reduce the problem to the solution of a system of linear algebraic equations. Several examples are provided to confirm the reliability and effectiveness of the proposed method.

MSC:
65M70 Spectral, collocation and related methods for initial value and initial-boundary value problems involving PDEs
65T60 Numerical methods for wavelets
65M12 Stability and convergence of numerical methods for initial value and initial-boundary value problems involving PDEs
41A50 Best approximation, Chebyshev systems
35R11 Fractional partial differential equations
26A33 Fractional derivatives and integrals
35Q35 PDEs in connection with fluid mechanics
76R50 Diffusion

Keywords:
second-kind Chebyshev wavelets collocation method; time-fractional diffusion-wave equation; shifted Chebyshev polynomials; system of linear algebraic equations

Software:
Matlab

Full Text: DOI

References:
[8] Hosseini, V. R.; Shivanian, E.; Chen, W., Local radial point interpolation (MLRPI) method for solving time fractional diffusion-


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