

عنوان مقاله:

A shifted fractional-order Hahn functions Tau method for time-fractional PDE with nonsmooth solution

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خلاصه مقاله:

In this paper, a new orthogonal system of nonpolynomial basis functions is introduced and used to solve a class of time-fractional partial differential equations that have nonsmooth solutions. In fact, unlike polynomial bases, such basis functions have singularity and are constructed with a fractional variable change on Hahn polynomials. This feature leads to obtaining more accurate spectral approximations than polynomial bases. The introduced method is a spectral method that uses the operational matrix of fractional order integral of fractional-order shifted Hahn functions and finally convertsthe equation into a matrix equation system. In the introduced method, no collocation method has been used, and initial and boundary conditions are applied during the execution of the method. Error and convergence analysis of the numerical method has been investigated in a Sobolev space. Finally, some numerical experiments are considered in the form of tables and figures to demonstrate the accuracy and capability of the proposed method.

کلمات کلیدی:

Fractional-order shifted Hahn functions, Fractional-time partial differential equations, Spectral method, Error analysis, Convergence Analysis

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