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Solution of Lane-Emden type equation using hybrid third kind Chebyshev polynomials and block-pulse functions operational matrix of differentiation. (English) Zbl 1455.65108

Summary: In this paper, first, a numerical method is presented for solving generalized linear and nonlinear Lane-Emden type equations. The operational matrix of derivative is obtained by introducing hybrid third kind Chebyshev polynomials and Block-pulse functions. This matrix with the tau method is then utilized to transform the differential equation into a system of algebraic equations. Finally, the convergence analysis is investigated and the efficiency of the proposed method is indicated by some numerical examples.

MSC:
65L05 Numerical methods for initial value problems involving ordinary differential equations
34A45 Theoretical approximation of solutions to ordinary differential equations
65L20 Stability and convergence of numerical methods for ordinary differential equations

Keywords:
hybrid functions; Chebyshev polynomials; block-pulse functions; operational matrix of derivative; Lane-Emden-type equation

Full Text: Link

References:

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