A Legendre Petrov-Galerkin method for fourth-order differential equations.

Summary: We present a Legendre Petrov-Galerkin method for one-dimensional linear fourth-order differential equations. A Legendre Petrov-Galerkin and Chebyshev collocation method is developed for the nonlinear Kuramoto-Sivashinsky equation. Numerical results are presented to demonstrate the efficiency of the proposed schemes, and optimal rates of convergence in the $L^2$-norm are rigorously derived.

MSC:

65N35 Spectral, collocation and related methods for boundary value problems involving PDEs
65M70 Spectral, collocation and related methods for initial value and initial-boundary value problems involving PDEs

Keywords:

Legendre Petrov-Galerkin method; fourth-order differential equations; Kuramoto-Sivashinsky equation; optimal error estimates

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References:


[22] Li, H.Y., Super spectral viscosity methods for nonlinear conservation laws, ()


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