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Error estimate of a Legendre-Galerkin Chebyshev collocation method for a class of parabolic inverse problem. (English) [Zbl 07398300]


Summary: A Legendre-Galerkin Chebyshev collocation method is presented for the parabolic inverse problem with control parameters. Optimal order of convergence of the semi-discrete method is obtained in $L^2$-norm for the nonlinear term being not globally Lipschitz continuous. For time-discretization, a Legendre-tau method is applied. The method is implemented by the explicit-implicit iterative method. Suitable basis functions are constructed leading to sparse matrices, and the nonlinear term is collocated at the Chebyshev-Gauss-Lobatto points computed explicitly by the fast Legendre transform. Numerical results are given to show the efficiency and capability of this space-time spectral method.

MSC:
65Mxx Numerical methods for partial differential equations, initial value and time-dependent initial-boundary value problems
35Kxx Parabolic equations and parabolic systems
35Rxx Miscellaneous topics in partial differential equations

Keywords:
error estimate; spectral method; Legendre-Galerkin Chebyshev collocation; inverse problem; over-specification

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References:


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