Yuan, Qi; Ma, Heping

Summary: The Legendre-Petrov-Galerkin method for the generalized Korteweg-de Vries equation with nonperiodic boundary conditions is analyzed. The nonlinear term is computed with the Chebyshev collocation method. The Crank-Nicolson scheme is applied to the time space, optimal error estimates in the $L^2$-norm are obtained for semi-discrete and fully-discrete schemes.

MSC:
65M20 Method of lines for initial value and initial-boundary value problems involving PDEs
65M60 Finite element, Rayleigh-Ritz and Galerkin methods for initial value and initial-boundary value problems involving PDEs
65M06 Finite difference methods for initial value and initial-boundary value problems involving PDEs
35Q53 KdV equations (Korteweg-de Vries equations)
65M15 Error bounds for initial value and initial-boundary value problems involving PDEs

Keywords: semidiscretization; numerical examples; Legendre-Petrov-Galerkin method; Chebyshev collocation method; Crank-Nicolson scheme; error estimates