

A HERMITE SPECTRAL METHOD FOR SOLITONS

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Abstract. We use the analytical soliton solutions of the Korteweg-de Vries (KdV) equation to test a new spectral numerical method for partial differential evolution equations with unbounded spatial domain. The proposed spatial discretization uses Hermite functions in the spectral space while the temporal discretization is performed by a symmetric exponential integrator coupled with fixed point iterations. The algorithm could be used to numerically describe the soliton behaviour, such as small-amplitude long waves on the free surface of water.

Key Words and Phrases: Free surface, solitons, Hermite spectral method, exponential integrators, KdV equation.

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