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Discontinuous Galerkin spectral/*hp* element modelling of dispersive shallow water systems.

(English) [Zbl 1067.76057](#)

J. Sci. Comput. 22-23, 269-288 (2005).

From the summary: We consider the unstructured spectral/*hp* discontinuous Galerkin formulation of weakly nonlinear dispersive Boussinesq equations and nonlinear shallow water equations (a subset of the Boussinesq equations). Discretization of the Boussinesq equations involves resolving third-order mixed derivatives. To efficiently handle these high-order terms, we present a new scalar formulation based on the divergence of the momentum equations. Numerical computations illustrate the exponential convergence with regard to expansion order. Finally, we simulate solitary wave solutions.

MSC:

76M10 Finite element methods applied to problems in fluid mechanics

Cited in **8** Documents

76M22 Spectral methods applied to problems in fluid mechanics

76B15 Water waves, gravity waves; dispersion and scattering, nonlinear interaction

76B25 Solitary waves for incompressible inviscid fluids

Keywords:

weakly nonlinear Boussinesq equations; exponential convergence; solitary wave

Full Text: [DOI](#)

References:

- [1] Dupont, F. (2001). Comparison of Numerical Methods for Modelling Ocean Circulation in Basins with Irregular Coasts, Ph.D. Thesis, McGill University.
- [2] Eskilsson, C., and Sherwin, S. J. A triangular spectral/*hp* discontinuous Galerkin method for modelling two-dimensional shallow water equations. *Int. J. Numeric. Meth. Fluids*, in press. · [Zbl 1085.76544](#)
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