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A FINITE DIFFERENCE METHOD FOR THE ONE-DIMENSIONAL VARIATIONAL BOUSSINESQ EQUATIONS

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Abstract. The variational Boussinesq equations derived by Klopman et. al. (2005) converse mass, momentum and positive-definite energy. Moreover, they were shown to have significantly improved frequency dispersion characteristics, making it suitable for wave simulation from relatively deep to shallow water. In this paper we develop a numerical code for the variational Boussinesq equations. This code uses a fourth-order predictor-corrector method for time derivatives and fourth-order finite difference method for the first-order spatial derivatives. The numerical method is validated against experimental data for one-dimensional nonlinear wave transformation problems. Furthermore, the method is used to illustrate the dispersive effects on tsunami-type of wave propagation.

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