

Stelling, G.; Zijlema, M.

An accurate and efficient finite-difference algorithm for non-hydrostatic free-surface flow with application to wave propagation. (English) Zbl 1032.76645

Int. J. Numer. Methods Fluids 43, No. 1, 1-23 (2003).

Summary: A numerical technique is presented for the approximation of vertical gradient of the non-hydrostatic pressure arising in the Reynolds-averaged Navier-Stokes equations for simulating non-hydrostatic free-surface flows. It is based on the Keller-box method that take into account the effect of non-hydrostatic pressure with a very small number of vertical grid points. As a result, the proposed technique is capable of simulating relatively short wave propagation, where both frequency dispersion and non-linear effects play an important role, in an accurate and efficient manner. Numerical examples are provided to illustrate this; accurate wave characteristics are already achieved with only two layers.

MSC:

76M20 Finite difference methods applied to problems in fluid mechanics

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

86A05 Hydrology, hydrography, oceanography

Cited in **1** Review
Cited in **39** Documents

Keywords:

free-surface flow; non-hydrostatic pressure; Keller-box scheme; wave propagation

Full Text: [DOI](#)

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