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COMPARAISON OF LAX-WENDROFF NUMERICAL SCHEMES SOLVING CONSERVATIVE AND NON-CONSERVATIVE BOUSSINESQ EQUATIONS TO AN OPERATIONAL CODE

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We compare a new third-order Lax-Wendroff (LW3) approach to the explicit discretization currently implemented in CEA's Taitoko code modelling the propagation of free surface waves. In a previous study, this explicit discretization of the LW3 scheme has been proved to be at least as accurate as the well-known RK3 method and requiring less computational time. In this study, the enhanced weakly dispersive and weakly nonlinear Boussinesq equations are solved in non-conservative and conservative forms, and centered fourth order finite differencing is used on the spatial derivatives for the new scheme. In the current implementation in Taikoto the standard weakly dispersive and weakly nonlinear Boussinesq equations are solved in conservative form with a scheme second order accurate in time and first order accurate in space. The different formulations are compared in terms of accuracy and computational cost both on academic and realistic benchmarks involving the propagation of a tsunami across the Pacific Ocean. With fixed parameters, the new method results in a better accuracy solving both the conservative and non-conservative forms.

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