

A Comparative Evaluation of Finite Difference Methods for the Extended Boussinesq Equations and Application to Tsunamis Modelling

Authors : Aurore Cauquis, Philippe Heinrich, Mario Ricchiuto, Audrey Gailler

Abstract : In this talk, we look for an accurate time scheme to model the propagation of waves. Several numerical schemes have been developed to solve the extended weakly nonlinear weakly dispersive Boussinesq Equations. The temporal schemes used are two Lax-Wendroff schemes, second or third order accurate, two Runge-Kutta schemes of second and third order and a simplified third order accurate Lax-Wendroff scheme. Spatial derivatives are evaluated with fourth order accuracy. The numerical model is applied to two monodimensional benchmarks on a flat bottom. It is also applied to the simulation of the Algerian tsunami generated by a Mw=6 seism on the 18th March 2021. The tsunami propagation was highly dispersive and propagated across the Mediterranean Sea. We study here the effects of the order of temporal discretization on the accuracy of the results and on the time of computation.

Keywords : numerical analysis, tsunami propagation, water wave, boussinesq equations

Conference Title : ICWMWG 2022 : International Conference on Wave Modelling and Wave Generation

Conference Location : Istanbul, Türkiye

Conference Dates : August 16-17, 2022