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Numerical modeling of tsunami propagation with improved dispersion effects

Taemin Ha, Jaeseol Shim and Jaeseon Yoo
Coastal Disaster Research Center, Korea Institute of Ocean Science & Technology, Korea

A huge tsunami may cause devastating damage not only on shores of neighboring countries but also on shores of distant countries. When tsunamis are triggered and propagate a long distance from the source area, those evolve into a train of waves due to wave dispersion effect. Therefore, the transoceanic propagation of tsunamis should be modeled by considering dispersion effects adequately. It may be computationally too impractical, however, to solve the Boussinesq equations or Navier-Stokes equations directly for calculation purposes because those models require very fine grid system. Thus, the linear shallow-water equations have been used to simulate transoceanic tsunami propagation in several existing models. In this study, a modified finite difference scheme is proposed by adding terms to the linear shallow-water equations in order to represent a varying water depth. First, the governing equations are slightly modified to consider the effects of a bottom slope. The numerical dispersion of the proposed model replaces the physical dispersion of the governing equations. The present model is then verified by applying it to tsunami propagation over an uneven bottom. Numerical results are compared with available numerical data from other models and performance of the model is analyzed in detail.

Biography

Taemin Ha has completed his Ph.D. at the age of 31 years and postdoctoral studies from Hanyang University. He is the postdoctoral scientist of KIOST (Korea Institute of Ocean Science & Technology), a national institute of Korea. He published more than 20 papers in reputed journals.

tmha@kiost.ac