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A Boundary-Fitted Nested Grid Model for Modeling Tsunami Propagation of 2004 Indonesian Tsunami along Southern Thailand

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Abstract : Many problems in oceanography and environmental sciences require the solution of shallow water equations on physical domains having curvilinear coastlines and abrupt changes of ocean depth near the shore. Finite-difference technique for the shallow water equations representing the boundary as stair step may give inaccurate results near the coastline where results are of greatest interest for various applications. This suggests the use of methods which are capable of incorporating the irregular boundary in coastal belts. At the same time, large velocity gradient is expected near the beach and islands as water depth vary abruptly near the coast. A nested numerical scheme with fine resolution is the best resort to enhance the numerical accuracy with the least grid numbers for the region of interests where the velocity changes rapidly and which is unnecessary for the away of the region. This paper describes the development of a boundary fitted nested grid (BFNG) model to compute tsunami propagation of 2004 Indonesian tsunami in Southern Thailand coastal waters. In this paper, we develop a numerical model employing the shallow water nested model and an orthogonal boundary fitted grid to investigate the tsunami impact on the Southern Thailand due to the Indonesian tsunami of 2004. Comparisons of water surface elevation obtained from numerical simulations and field measurements are made.

Keywords : Indonesian tsunami of 2004, Boundary-fitted nested grid model, Southern Thailand, finite difference method
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