Abstract

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Generation and propagation of tsunami by a moving realistic curvilinear slide shape with variable velocities in linearized shallow-water wave theory

The process of tsunami evolution during its generation under the effect of the variable velocities of realistic submarine landslides based on a two-dimensional curvilinear slide model is investigated. Tsunami generation from submarine gravity mass flows is described in three stages. The first stage represented by a rapid curvilinear down and uplift faulting with rise time. The second stage represented by a unilaterally propagation in the positive x- direction to a significant length to produce curvilinear two-dimensional models represented by a depression slump, and a displaced accumulation slide model. The last stage represented by the time variation in the velocity of the accumulation slide (block slide). By using transforms method, Laplace in time and Fourier in space, tsunami waveforms within the frame of the linearized shallow water theory for constant water depth are analyzed analytically for the movable source model. Effect of the water depths on the amplification factor of the tsunami generation by the submarine slump and slide for different propagation lengths and widths has been studied and the results are plotted. Comparison of tsunami peak amplitudes is discussed for different propagation lengths, widths and water depths. In addition, we demonstrated the tsunami propagation waveforms after the slide stops moving at different propagation times.