

Analytic solutions of seismic tsunamis' initial waveforms: a mathematical study

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Analytical solutions of initial waveforms of seismic tsunamis are mathematically derived in this paper. Using the linear potential theory, solutions of integration forms for three fundamental seabed deformations, which include rectangular, sine and cosine liftings, are firstly solved with the help of integral transforms. Next, for the initial waveform that means the wave profile at the time when the seabed deformation stops, analytic (closed-form) solutions are derived by simplifying previous solutions with some mathematical techniques. These analytic solutions constitute an important basis which provides the accurate initial waveform and conditions for performing the subsequent numerical calculations.

Keywords: tsunami, initial waveforms, analytic solutions