



On the Nonlinearity, Dispersion and Friction in Tsunami Modeling and Forecasting

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Nonlinearity, dispersion and friction are the necessary terms in the long wave equations. In the derivations of these equations the importance of the ratios i) depth to wave length and ii) amplitude to depth are considered. This consideration provides the modeler to neglect some of the terms according to the relative order of magnitudes of these ratios. Linearity may be sufficient in deep water. Nonlinearity is essential in shallow zone. The friction term becomes important in the shallow zone and at land. The dispersion becomes important in long distance propagation and also when the wave amplifies in the shallow zones. The importance of dispersion is also related to the depth and wave length ratio. Dispersion needs longer simulation time. All these terms have different effects on the results of the simulations and cause discrepancy and the effects the accuracy at a certain level. In the academic level of the modeling the accurate computations are necessary. But in operational level, since there is the limited time for the decision on watch, warning, alert actions, then some of these terms can be neglected at some stages of the computations. In this study all above conditions will be discussed with examples and best practice for tsunami modeling will be presented.

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