

DEPENDENCY OF TSUNAMI BEHAVIORS AND FORCES ON TOPOGRAPHY OF CROSS-SHORE SECTION

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Abstract

Tsunami is strongly transformed by spatial seabottom topography even in deep sea because it has the property of a long wave. Especially the transformation feature quite depends on the shape of cross-shore section. When the tsunami propagates on the coast with a very mild slope of less than $1/200$, the steep crest of the tsunami makes specified deformation induced by separation into several solitons, and the solitons break at specified sea depth corresponding to the tsunami height. When the sea bottom slope is steeper like $1/50$, the tsunami breaks in nearshore without the separation and its destructive force acts on coastal and residential structures. On the coast of farthermore steep slope, no breaking of the tsunami takes place and standing wave is formed.

Thus the cross-sectional slope of the coast much affects the tsunami profile, which is closely related to fundamental property of the tsunami. Therefore, the countermeasures for the mitigation of the tsunami disasters should be selected taking the tsunami transformation into account.

The present paper describes qualitative and quantitative properties of transformed tsunami by referring to the results of numerical simulations and laboratory experiments on tsunami deformation and force for various sea bottom slopes. The effects of structural measures on the reduction of tsunami inundation are discussed considering tsunami deformation by the structures and forces on them.