



The numerical simulation of tsunami generated by underwater landslide processes

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The authors performed numerical simulation of underwater landslide dynamics with regards for displacement and velocity characteristics of the landslide mass as well as of surface water waves generated by this landslide accounting for real bathymetry of underwater slope. The landslide dynamics was calculated in the framework of the elastoplastic model of landslide [1]. Numerical simulation of underwater landslide motion used explicit finite-difference scheme which permits to simulate the nonlinear behavior of pore saturated sediments under conditions of plastic flow above yield stress. The model of sediments rested on relatively rigid base was used. The dynamics of surface water waves was described by nonlinear system of shallow-water equations using the modified explicit difference scheme with fulfilled stability conditions. The simulation was performed for two-dimensional case. Dynamical interaction between landslide motion and surface waves was described by the continuity equation. It is demonstrated that the tsunami wave in the uppermost area of the landslide is preceded by the water recession from a beach with the following runup of the wave crest. The runup to the opposite beach presents the first positive phase and the wave height is less than that in uppermost area of the landslide. It was obtained that elastoplastic landslide-generated wave and its transformation during sliding are of a similar character with those when using solid slab or visco-plastic liquid model[2]. However, several features of generated waves in these models are essentially different.

1.Garagash I.A.,Lobkovsky L.I., Kozyrev O.R. and Mazova R.Kh. Oceanology v.43, 185, 2003.

2.Jiang.L. and LeBlond P.H. J.Geophys.Res. v.98, 10.303, 1993