



Specific character of formation of extreme internal sea waves

T. G. Talipova (1), E.N. Pelinovsky (1), A.A. Kurkin (2)

(1) Institute of Applied Physics RAS, Russia (tata@hydro.appl.sci-nnov.ru), (2) Nizhny Novgorod State Technical University

To explain the formation of extreme internal waves in the sea the following developed mechanisms for extreme surface wave appearance may be used, like dispersion focusing and modulation instability. The modulation instability mechanism for internal wave dynamics is available for specific water density stratification when the nonlinear cubic parameter is positive. It is shown that such situation is not too exotic for real ocean shelf conditions and widely distributed for shelves in various latitudes. The dynamics of extreme internal wave in the frame of the describing evolution equation is more reach than in the frame of the Shrodinger equation. The dispersion focusing for internal waves also has special characteristic features due to both signs of nonlinearity. The additional nonlinear mechanism of extreme internal wave formation is conditioned by the horizontal variability in water stratification and corresponding variability of nonlinear parameters. The formations of solitary wave of great amplitude from small amplitude solitary wave and due to breather transformation on the horizontally variable background also are presented for model situation. The possibility of appearance of extreme internal impulse on some real ocean shelves is shown. It is obtained the formation of internal solitary wave with amplitude about 16 m (total depth is about 30m) from initial table solitary wave with amplitude about 5 m for conditions of Russian Arctic sea shelf where the cubic nonlinear parameter α_1 changes his value and sign on the distance about 10 km.