



Solitary wave run-up on a beach

Ira Didenkulova (1,2), Efim Pelinovsky (1) and Tarmo Soomere (2)

(1) Institute of Applied Physics, Nizhny Novgorod, Russia, (2) Institute of Cybernetics, Tallinn, Estonia (Contact E-mail: ira@cs.ioc.ee)

The problem of the sea wave run-up on a beach is discussed in the framework of the rigorous solutions of the nonlinear shallow-water theory. Previously, the run-up of solitary impulses of various shapes (Gaussian and Lorentz impulses, soliton, impulses of special shape) on the beach has been investigated in literature in the framework of this theory, and various formulas for the run-up height dependence on the incident wave shape have been obtained. In this paper, the key and novel moment is the parameterization of formulas for the extreme (maximal) wave characteristics on a beach (run-up and draw-down heights, run-up and draw-down velocities and breaking parameter), if the wave length is determined on a $2/3$ level of the maximum height, connected with length of significant wave in oceanography; thus the effect of difference in the wave shapes will be graded. As a result, the universal analytical expression for the extreme (maximal) wave characteristics can be easily derived for the applications, in particular in tsunami problems.