



Runup of solitary waves of different shapes on a beach

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The problem of the sea wave runup on a beach is discussed in the framework of the rigorous solutions of the nonlinear shallow-water theory. Early the runup of solitary pulses of various shapes (Gaussian and Lorentz pulses, soliton, pulses of special shape) on the beach has been investigated in literature in the framework of this theory, and various formulas for the runup height depending from the incident wave shape have been obtained (Synolakis, Yeh, Pelinovsky). Key and novel moment here is the proof of universality of the expression for the maximum runup height, if the wave length is determined on a $2/3$ level of the maximum height, connected with length of significant wave in oceanology; thus the effect of difference in the wave shapes will be graded. As a result, the universal analytical expression for the runup height can be derived convenient for the applications, in particular in tsunami problem.