



Research of large-amplitude waves evolution in the framework of shallow water equations and their implication for people's safety in extreme situations

Efim Pelinovsky (1), Natalya Chaikovskaia (2), and Artem Rodin (3)

(1) Institute of Applied Physics, Russian Academy of Sciences, Nizhny Novgorod, Russia (pelinovsky@hydro.appl.sci-nnov.ru), (2) Lobachevsky State University (National Research University), Nizhny Novgorod, Russia (na4aykovskaya@gmail.com), (3) Institute of Cybernetics at Tallinn University of Technology, Tallinn, Estonia (artem@cens.ioc.ee)

The paper presents the analysis of the formation and evolution of shock wave in shallow water with no restrictions on its amplitude in the framework of the nonlinear shallow water equations. It is shown that in the case of large-amplitude waves appears a new nonlinear effect of reflection from the shock front of incident wave. These results are important for the assessment of coastal flooding by tsunami waves and storm surges. Very often the largest number of victims was observed on the coastline where the wave moved breaking. Many people, instead of running away, were just looking at the movement of the "raging wall" and lost time. This fact highlights the importance of researching the problem of security and optimal behavior of people in situations with increased risk. Usually there is uncertainty about the exact time, when rogue waves will impact. This fact limits the ability of people to adjust their behavior psychologically to the stressful situations. It concerns specialists, who are busy both in the field of flying activity and marine service as well as adults, young people and children, who live on the coastal zone. The rogue wave research is very important and it demands cooperation of different scientists - mathematicians and physicists, as well as sociologists and psychologists, because the final goal of efforts of all scientists is minimization of the harm, brought by rogue waves to humanity.