

Abstract

Soliton or solitary wave is a physical phenomenon in which a wave propagates without changing of form in a dispersive media. It is a condition when effects of nonlinearity is balanced with effects of dispersion. Therefore solitary wave propagation is a standard test for testing nonlinearity and dispersiveness of a wave model and its numerical implementation. One interesting case of the soliton phenomenon is the soliton collision which is an interaction between two solitary waves facing each other and producing a high impact wave. The phenomenon can be used to study tsunami wave interactions. In this paper we study the phenomenon by using numerical approach. We use a nonlinear dispersive 1D Boussinesq model that is implemented numerically by using Finite Element implementation in a collocated grid. The accuracy of the implementation is test by simulating two test cases of solitary wave, i.e. the propagation of solitary wave againsts analytical soliton solution of Korteweg-de Vries (KdV) and the collision of two identical solitary waves. Results of simulations are also compared with results of the nonlinear nondispersive Shallow Water Equations (SWE).

Keywords: Soliton, Soliton collision, Finite Element Method, Boussinesq, Korteweg-de Vries.