

Abstract

Soliton is a type of wave that propagates with constant speed without changing its form in dispersive and nonlinear media, such as water. This is due to effects of nonlinearity and dispersion that cancel each other, or in balanced condition. Research on soliton is important, especially for studying tsunami wave propagation, in which soliton is a good approximation for tsunami wave. In this paper, we study the soliton splitting phenomenon, in which a soliton can be split into 2, 3, 4, etc, when it is propagating into shallower water. Here, we study the phenomenon by using numerical simulation. We use a Boussinesq type of model called Variational Boussinesq. The model is implemented by using Galerkin-Finite Element Method. We compare results of simulation with analytical approach that is derived from the theory of inverse scattering based on Korteweg de-Vries (KdV) equation. Several simulation scenarios are performed for simulating a soliton that split into 2, 3, and 4 solitons, when propagating into shallower water. These scenarios are compared with analytical approach.

Keywords: Soliton, Soliton fission, Finite Element Method, Boussinesq, Variational Boussinesq.