

Two-dimensional interaction of Benjamin-Ono solitons — Comparison with solution of KP equation —

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Abstract:

Benjamin-Ono(BO) equation is a model equation for weakly nonlinear long waves in a two-layer fluid in which one layer has infinite depth and the other layer is shallow compared to the wavelength. The authors studied two-dimensional interaction of the BO solitons by the two-dimensional BO(2dBO) equation which describes strong interaction for the small angle of propagation directions[1]. As a result the generation of large soliton and its dependency of interaction angle were found. This previous analysis is limited to symmetric initial conditions in which the waves with same amplitude are located symmetrically to a coordinate axis. In this study the interaction for the asymmetrical initial conditions is investigated using the windows method[2]. This study is closely related to the Kadomtsev-Petviashvili(KP) equation which also describes two-dimensional behavior of the nonlinear shallow water wave, long wave in stratified fluid and so on. Kodama et al.[3] clarified the relation between the numerically obtained asymptotic solution of V-shape initial value problem and new class of soliton solutions. We investigate the similar initial value problem of 2dBO equation and compare the result with the one of KP equation.

References:

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