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Features of two-soliton interaction in shallow water

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It is well known that in coastal zone wind waves transform to the set of solitary waves, called solitons. According to the rigorous theory, two-soliton interactions play a definitive role in the formation of the structure of soliton field. We study the two-soliton interaction in the framework of the Korteweg-de Vries (KdV) equation in details. It is shown that such an interaction (especially interaction of solitons with amplitude ratio close to the critical value, which separates exchange and overtake regimes) leads to the decrease of the 3rd and 4th moments of the nonlinear wave field while the 1st and the 2nd moments remain unchanged due to the conservation of the mass and momentum. These results are compared with predictions of linear interference of solitary waves. Such linear interference leads to increase of all moments except for the first.
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