

# Solitons and dispersive shock waves

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## **Abstract:**

Historically, solitons first appeared in the context of shallow water waves. Interestingly, two dimensional interacting solitons with “X,Y” as well as ones with more complex structure can frequently be seen on flat beaches. These solutions are related to the unidirectional Kadomtsev-Petviashvili and two-directional Benney-Luke equations. Also, in many applications, including water waves and nonlinear optics, dispersive shock waves (DSWs) appear. One of the key models of DSWs is the Korteweg-deVries (KdV) equation. The long time behavior of the KdV equation for general step-like behavior is investigated. While multi-step data evolve with multi-phase dynamics at intermediate times, these interacting DSWs eventually merge to form a single-phase DSW at large time.