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Non-classical dispersive shock waves in shallow water PATRICK SPRENGER, MARK HOEFER, Univ of Colorado - Boulder — A classical model for shallow water waves with strong surface tension is the Kawahara equation, which is the Korteweg-de Vries (KdV) including a fifth order derivative term. A particular problem of interest to these types of equations is step initial data, known as the Riemann problem, which results in a shock in finite time. Unlike classical shock waves, where a discontinuity is resolved by dissipation, the dispersive regularization results in the discontinuity resolved as a dispersive shock wave (DSW). When parameter choices result in non-convex dispersion, three distinct dynamic regimes are observed that can be characterized solely by the amplitude of the initial step. For small jumps, a perturbed KdV DSW with positive polarity and orientation is generated, accompanied by small amplitude radiation from an embedded solitary wave leading edge, termed a radiating DSW. For moderate jumps, a crossover regime is observed with waves propagating forward and backward from the sharp transition region. For sufficiently large jumps, a new type of DSW is observed we term a translating DSW were a partial, non-monotonic, negative solitary wave at the trailing edge is connected to an interior nonlinear periodic wave and exhibits features common to both dissipative and dispersive shock waves.

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