

Stable undular bores

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Abstract

Abstract: I will discuss the ‘global’ nonlinear asymptotic stability of the traveling front solutions to the Korteweg-de Vries–Burgers equation, and other dispersive-dissipative perturbations of the Burgers equation. Earlier works made strong use of the monotonicity of the profile, for relatively weak dispersion effects. We exploit the modulation of the translation parameter, establishing a new stability criterion that does not require monotonicity. Instead, a certain Schrodinger operator in one dimension must have exactly one negative eigenvalue, so that a rank-one perturbation of the operator can be made positive definite. Counting the number of bound states of the Schrodinger equation, we find a sufficient condition in terms of the ‘width’ of a front. We analytically verify that our stability criterion is met for an open set in the parameter regime including all monotone fronts. Our numerical experiments, revealing more stable fronts, suggest a computer-assisted proof. Joint with Blake Barker, Jared Bronski, and Zhao Yang.