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Unsteady Undular Bore Transition in Fully Nonlinear Dispersive Wave Dynamics

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A complete set of conditions describing the expanding undular bore transition in nonlinear conservative wave dynamics is derived. The transition conditions are obtained in a general form by employing the asymptotic formulation of the problem based on the Whitham modulation equations and allow, in particular, determination of the lead solitary wave amplitude as a function of the initial jump in (generally) non-integrable systems. Several examples pertaining to the shallow water dynamics and collisionless plasma physics are considered.

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