Abstract Submitted
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A model for internal bores in continuously stratified fluids[1] BRIAN WHITE, University of North Carolina at Chapel Hill — Internal bores, propagating horizontal jumps that connect regions of varying density structure, are generated in the ocean by stratified tidal flow over topography, river plumes, and the breaking of internal waves on a slope. In an undular or soli-bore, internal waves are radiated from the jump and in some cases strong shear and turbulent mixing may occur. Theories for the propagation speed and energy flux through an internal jump have been based on idealized two-layer stratification and require assumptions about the distribution of energy dissipation between internal layers. We discuss a theoretical model for an internal jump in a continuously stratified fluid that applies the Dubreil-Jacotin-Long (DJL) equation (a model for nonlinear solitary waves for which an energy-conserving bore is a well-known limiting solution) and adds a term for depth-dependent dissipation to calculate the velocity and density structure across the jump. The applicability of the continuous model is explored with two- and three-dimensional Navier Stokes calculations of internal bores formed from dam-break initial conditions, focusing on the influence of ambient stratification on energy dissipation and turbulent mixing.

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