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Non-Boussinesq internal bores: Bridging the gap between the single layer, and boussinesq cases ZACHARY BORDEN, University of California, Santa Barbara, TILMAN KOBLITZ, Technical University of Denmark, ECKART MEIBURG, University of California, Santa Barbara — Internal bores, or hydraulic jumps, arise in many atmospheric and oceanographic phenomena. The classic single-layer hydraulic jump model accurately predicts a bore's behavior when the density difference between the expanding and contracting layer is large (i.e. water and air), but fails in the Boussinesq limit. A two-layer model, where mass is conserved separately in each layer and momentum is conserved globally, does a much better job but requires for closure an assumption about the loss of energy across a bore. Our previous study used 2D direct numerical simulations in order to directly examine the energy fluxes within a bore, and was able to provide us with an appropriate closure relation in the Boussinesq case. Now, we have extended our simulations to non-Boussinesq bores in order to generate an analytical model that bridges the gap between single, and two-layer models. We also perform 3D large eddy simulations to confirm that our model and results generalize to three dimensions, and higher Reynolds numbers.

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