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Evolution of disturbances on separate pycnoclines M. NITSCHE, Univ. of New Mexico, P. WEIDMAN, Univ. of Colorado at Boulder, R. GRIMSHAW, Loughborough University — Motivated by the experiments on leapfrogging internal solitary waves reported in Weidman and Johnson (J. Fluid Mech., 122, 1985), we have developed a numerical code to follow the long-time inviscid evolution of isolated mode-two-like disturbances on two separate pycnoclines in a three-layer stratified fluid bounded by rigid horizontal top and bottom walls. We study the dependence of the solution on the input parameters, namely the three fluid densities and the two interface thicknesses, for fixed initial disturbance amplitude. For most parameter values, the two disturbances separate immediately and travel as solitary waves with distinct speed. In a certain parameter regime however, the two waves pair up and oscillate for some time in a leapfrog fashion with equal average speed. The motion is slowly varying as each wave loses energy into a dispersive tail, which causes the oscillation period and magnitude to increase, until the waves eventually separate. We record the separation time, oscillation period and magnitude, and final speed and magnitude as a function of the input parameters.

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