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Hamiltonian approach to internal geophysical waves

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We study the interaction between two-dimensional surface water waves and internal waves in a flow consisting of a lower layer with an impermeable flat bed and an overlying layer with a free surface. Both layers have constant density and in each the flow is of constant vorticity, driven by gravity and the Coriolis force. This system arises as a simplified model of the coupling of surface and internal geophysical waves. By examining the governing equations of the system we provide a Hamiltonian formulation. This allows for linear and nonlinear approximations.