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Two-layer continuously stratified flow JOHN MCHUGH, University of New Hampshire — Continuously stratified flow in two layers is considered. The interface between layers is defined by a jump in the Brunt-Vaisala frequency, N, and a sudden shift in the direction of the mean horizontal wind. This configuration is suggested by recent observations over isolated mountains showing the presence of very large amplitude internal waves. A coordinate system is chosen that makes this background state equivelent to the two-dimensional Kelvin-Helmholtz problem, now with the jump in N. Previous work has shown that resonant over-reflection, where the mean flow creates waves without any incident wave, may occur even with constant N throughout. Linear theory shows that the addition of the jump in N results in a larger interval of wavenumbers for resonant over-reflection. Linear and weakly nonlinear theory do not show any evidence of larger amplitude motion near the interface, and this feature of the experiments may be a strongly nonlinear phenomena. Numerical simulation with this background state shows that waves are not spontaneously created in the parameter region where resonant over-reflection should occur, but must be initiated with some type of disturbance. The results depend strongly on the form and strength of this disturbance. Internal waves and incoherent noise have been separately treated as disturbances. The results indicate that resonant over-reflection is one plausible explanation for the large amplitude waves that were found in the measurements.

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