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Absolute instability of gravity waves[1] MADIHA AHMED, JEAN-MARC CHOMAZ, Laboratoire d'Hydrodynamique (LadHyX), Ecole Polytechnique - CNRS — Although large-scale internal gravity waves of finite amplitude are known to be unstable, they are frequently observed in the lee of topography. We propose an explanation for this paradox by showing that the instability of these waves is convective and not absolute. Hence, in the frame of the mountain, a localized initial perturbation gives rise to a wave packet that grows but is entrained downstream, eventually leaving the flow undisturbed. The evolution of one such localized perturbation of a uniform finite-amplitude gravity wave is computed using direct numerical simulation of the Navier-Stokes equation under the Boussinesq approximation. The wave packet's edge velocity is determined by analyzing the amplitude of the response on spatio-temporal rays. This generic technique allows discrimination between the absolute and convective nature of the instability and suggests that transition to turbulence might occur due to the nonlinear evolution of absolute instability.

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