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Nonnormal transient growth of triadic resonant internal gravity waves KEVIN HA, JEAN MARC CHOMAZ, Ecole Polytechnique, SABINE ORTIZ, ENSTA — Triadic resonant instability is a key component in the understanding of the dissipation process of inertia gravity waves for geophysical applications like oceanic circulation, which is still incompletely understood. A key process in the oceanic circulation is the vertical mixing, which makes it possible for dense deep water to reach the surface. Global warming regulation by the ocean then depends on mechanisms controlling the vertical mixing of deepwater masses. It was recently proposed by Garrett & Kunze (2007) that the mixing results from the instabilities of internal gravity waves generated by interaction between the barotropic tide and bottom topography (continental shelf, underwater mount). The present work focuses on the energy approach of the triadic resonant instability and demonstrates that due to the nonnormality of the evolution operator, stable triadic resonant interactions result in a transient amplification of perturbation energy. Computations show that they can lead to a longer and more intense transient growth than unstable triads. Instead of being related to the differential growth of a stable and an unstable modes like for unstable triads, the transient growth of stable triads originates from the differential rotation (i.e. phase shift) of two stable eigenmodes.

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