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Energy transfer in resonant and near-resonant internal wave triads for weakly non-uniform stratifications. Part I: Unbounded domain ANIRBAN GUHA, SARANRAJ GURURAJ, University of Dundee — Using multiple scale analysis, reduced order equations for amplitude evolution is derived for resonant and near-resonant global triads consisting of weakly nonlinear internal gravity wave packets in weakly non-uniform density stratifications in an unbounded domain in the presence of viscous and rotational effects. Such triad interactions are one of the mechanisms by which internal waves cascades its energy to small scales, leading to ocean turbulence and mixing. Non-uniform stratification introduces detuning, i.e. mismatch in the vertical wavenumber triad condition, which may strongly affect the energy transfer process. We find that different triads undergo different amounts of detuning for the same changes in the background stratification. Additionally we study the effects of wave-packets' width, group speeds, nonlinear coupling coefficients, and viscosity on energy transfer and growth rates in weakly varying stratification. We also investigate the effect of detuning on energy transfer in varying stratification for different daughter wave combinations of a fixed parent wave. Moreover, we identify the optimal background stratification in a medium of varying stratification for a parent wave to form a resonant triad, which leads to maximal energy transfer.

Anirban Guha
University of Dundee

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