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Inherently Unstable Internal Gravity Waves REZA ALAM[1], University of California, Berkeley — Here we show that there exist internal gravity waves that are inherently unstable, that is, they cannot exist in nature for a long time. The instability mechanism is a one-way (irreversible) harmonic-generation resonance that permanently transfers the energy of an internal wave to its higher harmonics. We show that, in fact, there are countably infinite number of such unstable waves. For the harmonic-generation resonance to take place, nonlinear terms in the free surface boundary condition play a pivotal role, and the instability does not obtain for a linearly-stratified fluid if a simplified boundary condition such as rigid lid or linear form is employed. Harmonic-generation resonance discussed here also provides a mechanism for the transfer of the energy of the internal waves to the higher-frequency part of the spectrum where internal waves are more prone to breaking, hence losing energy to turbulence and heat and contributing to oceanic mixing.

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