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Boundary forced internal waves in a non-uniform stratification: diminution and resonant pathways to instability SASAN JOHN GHAEMSAIDI, THOMAS PEACOCK, MIT — We study the surface forcing of internal waves in a non-uniform stratification comprising a relatively thin, highly stratified upper layer sitting atop a deep, weakly stratified lower layer. Such a system theoretically yields a range of transmission features for harmonic boundary forcing, with the response ranging from diminution to resonant growth depending on the degree of coherence between the constitutive waves in the upper stratification layer. A series of laboratory experiments are performed in order to investigate the role of wave interference in tuning wave transmission. We find that the occurrence of destructive interference in the upper stratification naturally yields diminution of the transmitted wave. Conversely, constructive interference results in a notable amplification of the wave field over time scales on the order of the forcing period; the development of nonlinear wave-wave interactions due to wave amplification is observed over longer time scales. Good agreement is obtained between the experimental results and a weakly viscous, long wave model of our system within the linear regime.

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