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Experimental study on super-harmonic wave generation by resonant interaction between internal wave modes DHEERAJ VARMA, Department of Aerospace Engineering, Indian Institute of Technology Madras, Chennai-600036, India, PAULINE HUSSEINI, THIERRY DAUXOIS, SYLVAIN JOUBAUD, PHILIPPE ODIER, Univ Lyon, ENS de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, F-69342 Lyon, France, MANIKANDAN MATHUR, Department of Aerospace Engineering, Indian Institute of Technology Madras, Chennai-600036, India — We present an experimental study of resonant generation of super-harmonic internal waves as a result of interaction between horizontally propagating vertical internal wave modes m and n at frequency ω in a uniformly stratified finite-depth fluid. Theoretical studies have shown that modes m and n at frequency ω and mode-p = |m-n|at frequency 2ω are in triadic resonance at specific values of ω. To demonstrate the occurrence of this triadic resonance, a primary wave field of modes m and n at various ω is forced using a novel internal wave generator, and the spontaneous growth (or lack thereof) of the super-harmonic mode-p = |m-n|at frequency 2ω is measured. A super-harmonic wave field with a predominantly mode-p = |m-n|structure is observed over a finite range of frequency ($\Delta\omega \simeq 0.03$N) around the resonant value, where N is the uniform buoyancy frequency. The observed spatial growth of the super-harmonic wave field is then quantitatively compared with the predictions from amplitude evolution equations at resonance at various forcing amplitudes, thereby validating this model.

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