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Nonlinear internal wave generation by an oscillating cylinder HEPENG ZHANG, University of Texas at Austin, BENJAMIN KING, BRUCE RODENBORN, HARRY SWINNEY — In a density stratified fluid a perturbation at a frequency below the Brunt-Vaisala frequency N will generate internal waves. Internal waves play an important role in the atmosphere and oceans, but their generation mechanisms (especially nonlinear effects) are not well understood. We use particle image velocimetry to study internal waves generated by an oscillating cylinder in a stratified fluid with a linear density gradient (N=constant). When the cylinder is oscillated at ω, both fundamental waves (frequency ω) and harmonics at $n\omega$ are observed for integers n such that $n\omega \leq N$. The harmonics are generated by either nonlinear wave-wave interaction or cylinder-fluid interaction. For weak forcing, the intensity of the fundamental and second harmonic scales linearly and quadratically respectively with the forcing amplitude.

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