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Self-generation of axisymmetric internal wave super-harmonics SAMUEL BOURY, Ecole Normale Superieure de Lyon, THOMAS PEACOCK, Massachusetts Institute of Technology, PHILIPPE ODIER, Ecole Normale Superieure de Lyon — Numerous studies have been devoted to non-linear phenomena involving internal waves, particularly to the generation, from a primary wave field, of waves at lower (sub-harmonics) or higher (super-harmonics) frequencies, often associated with other wave numbers and therefore other scales to which energy can be transferred. For plane waves considered in a Cartesian geometry, non-linear self-interaction terms are null, preventing super-harmonics from existing in linearly stratified fluids. Super-harmonics are thus only expected to appear in non-linear stratifications. In axisymmetric geometry, however, the description of the wave field in terms of Bessel functions yields non-zero self-interaction terms, even in a linear stratification, and theory therefore predicts spontaneous generation of superharmonics. We present an experimental observation of super-harmonics generated by self-interacting axisymmetric internal waves in linear stratified fluids. Excited at sufficiently low frequency, the wave field and its first harmonic are both propagating waves: we show that they remain axisymmetric and can be described by modes, or by a combination of modes. The selection of these modes is controlled by boundary conditions from the doubly confined (lateral and vertical) geometry.

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