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Resonance and transmission of axisymmetric internal wave modes[1] PHILIPPE ODIER[2], SAMUEL BOURY, Laboratoire de Physique, Ecole Normale Superieure de Lyon, France, THOMAS PEACOCK, Department of Mechanical Engineering, MIT, USA — To date, axisymmetric internal wave fields, relevant to atmospheric waves generated by storm cells and oceanic near-inertial waves produced by surface perturbations, have been experimentally produced using an oscillating sphere or torus as the source. Here, we use a wave generator configuration capable of exciting axisymmetric internal wave modes of arbitrary radial form. The efficiency of the wave generator is measured through careful estimation of the wave amplitude based upon group velocity arguments, and the effect of vertical confinement is considered to induce resonance, identifying a series of experimental resonant peaks agreeing well with theoretical predictions. In the vicinity of resonance, the waves undergo a transition to nonlinear behavior. In a second step, we investigate transmission of these modes in nonlinear stratifications. Two configurations are studied: in the case of a free incident wave, a transmission maximum is found in the vicinity of evanescent frequencies. In the case of a confined incident wave, resonant effects lead to enhanced transmission rates from upper to lower layer. We consider the oceanographic relevance of these results by applying them to an example oceanic stratification from the Arctic, finding that there can be real-world implications.

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