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Spatial structure of tidally generated internal waves[1] MATTHEW PAOLETTI, AMADEUS DETTNER, MATTHEW DRAKE, HARRY L. SWINNEY, University of Texas at Austin — Tidal flow over bottom topography is one of the main sources of internal wave energy in the ocean, which may be converted into gravitational potential energy through mixing when the internal waves break. Internal wave breaking can occur when the destabilizing vertical shear of the waves overcomes the stabilizing effects of gravity. While past studies have determined the conversion rate of the tidal motions into internal wave energy, a general understanding of the spatial structure and shear profiles of tidally generated internal waves is lacking. Here, we present 2D experimental and computational studies of internal wave generation by tidal flow over several types of topographic ridges. For each topographic profile, we vary the criticality parameter, which is the ratio of the topographic slope to the wave beam slope, by independently changing the tidal frequency, stratification, and topographic slope. We also consider cases where the topography is beneath a turning depth, below which internal waves are evanescent owing to the weak stratification. The spatial structure of the internal waves is characterized by the velocity amplitude, principal wavenumber, width, and the local Richardson number, which determines the stability properties.

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