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Sound propagation through internal gravity wave fields in a laboratory tank[1] LIKUN ZHANG, HARRY L. SWINNEY, University of Texas at Austin, YING-TSING LIN, Woods Hole Oceanographic Institution — We conduct laboratory experiments and numerical simulations for sound propagation through an internal gravity wave field. The goal is to improve the understanding of the effect of internal gravity waves on acoustic propagation in the oceans. The laboratory tank is filled with a fluid whose density decreases linearly from the bottom to the top of the tank; the resultant buoyancy frequency is 0.15 Hz. A 1 MHz sound wave is generated and received by 12.5 mm diameter transducers, which are positioned 0.2 m apart on a horizontal acoustic axis that is perpendicular to the internal wave beam. The fluid velocity field, measured by Particle Image Velocimetry (PIV), agrees well with results from simulations made using a Navier-Stokes spectral code. The sound intensity at the receiver is computed numerically for different measured and simulated frozen density fields. Fluctuations in the sound speed and intensity are determined as a function of the location of the receiver and the frequency and phase of the internal waves.

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