

Abstract Submitted
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The near wake of a towed grid in a stratified fluid¹ XINJIANG XIANG, TRYSTAN MADISON, PRABU SELLAPAN, GEOFFREY SPEDDING, University of Southern California — Though much detailed quantitative information has been assembled to describe the late wakes behind various objects in stably-stratified fluids, much less is known about the early stages when the flow begins to feel the effects of the background density gradient. Here we report on experiments on the early wake of a towed grid, with $Re \in \{2700, 11000\}$, and $Fr \in \{0.6, 9.1\}$. Internal waves are found for all Fr , originating as the flow turns around the obstacle, with wavelength linearly proportional to Fr and approximately constant amplitude. The mean centerline stream-wise velocity is strongly affected by the lee waves, and so depends on Fr . Strong vertical shear is observed at the wake edge, leading to overturning through Kelvin-Helmholtz instabilities. Stratified turbulence develops up to $Nt \approx 10$ (except at the lowest Fr), with buoyancy Reynolds number independent of Fr at higher Nt . Developing anisotropy in the horizontal and vertical directions in the early wake is described for both mean and fluctuating quantities. The data and their variation with Re and Fr comprise a start towards making a generally available database for detailed comparisons with numerical experiment.

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