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Numerical Simulations of the Internal Waves Produced by a Submerged Body in a Stratified Fluid LAURA BRANDT, DEVIN CONROY, JAMES ROTTMAN, Leidos — We attempt to gain some insight into the modeling of internal waves produced by a submerged body traveling horizontally at high Reynolds number in a strongly stratified fluid by comparing numerical simulations with linear theory. Two types of internal waves are generated by the horizontal motion of a body in a stratified fluid: lee waves, which are steady in a reference frame moving with the body and are generated by the motion of the body itself, and wake waves, which are unsteady and generated by the turbulent wake. Traditionally the lee waves have been represented in linear theories by a source singularity in the continuity equation, but recently it has been argued that a body force needs to be added to the momentum equations in order to accurately represent the lee waves. We test this latter hypothesis directly by comparing linear theory with our numerical simulations in which either a free-slip or a no-slip boundary condition at the surface of the body is imposed. The free-slip boundary condition represents a body with no downstream recirculation region, so the source singularity should be accurate, and the no-slip boundary condition would have a downstream recirculation region, so that the body force should be necessary.

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