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The Turbulent Wake and Internal Wave Field Due to a Sphere Moving in an Ocean Thermocline LAURA BRANDT, JAMES ROTTMAN, CECILY TAYLOR, Leidos, DAVE BROUTMAN, Computational Physics Inc — We use ray theory to gain insight into the generation and propagation of internal waves produced by a sphere towed horizontally at constant speed in an idealized ocean thermocline. In particular, we seek to test a previously proposed model of internal wave generation produced by the flow over the body and the disturbances produced by the turbulent wake within the framework of a ray model of the internal waves. This model approximates the stratified flow over the sphere as a combination of a distribution of sources representing the steady internal wave flow, relative to the sphere, and a vertically oscillating sphere, representing the waves generated by the turbulent eddies in the wake. The frequency of oscillation of the sphere is based on laboratory observations of the frequency of shedding of coherent structures in the wake. We formulate a ray model of this flow that incorporates the source distribution as the initial conditions of the internal wave rays produced by the sphere. The results of our simulations are compared with laboratory experiments. The steady wave flow is well represented by this model, in agreement with previous studies. The model of the generation of the unsteady waves, which until now have been untested, requires some additional tuning of the parameters.

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