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Internal wave emission by a stratified turbulent wake with non-zero net momentum AMMAR ABDILGHANIE, PETER DIAMESSIS, Cornell University — The internal waves emitted by the stratified turbulent wake of a towed sphere are simulated using a 3D fully nonlinear spectral code in a parallel computing environment at two Reynolds numbers: 5,000 and 100,000 and three Froude numbers: 4, 16, and 64. The 2D Arc wavelet is used to extract the resonant horizontal scales from the horizontal divergence field on horizontal planes above the wake center line. Wave packets with length scales comparable to the sphere diameter are emitted from the wake with a decay rate increasing with both Froude and Reynolds numbers. The length scales increase with increasing Froude numbers and decreasing Reynolds numbers. Azimuth angles obtained from the Morlet2D wavelet are highly concentrated around 60 deg. Analysis of time series using 1D wavelet transforms reveals nearly constant frequencies (corresponding to polar angle 30$\pm$2 deg.) at the low Reynolds number simulations. At the high Reynolds number the polar angles are much higher (45-60 deg.) and slowly decay over time. Finally, wave steepness increases with both Reynolds and Froude numbers.

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