

Abstract Submitted  
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**High Reynolds Number Stratified Turbulent Sphere Wake Measurements**<sup>1</sup> KENNETH KALUMUCK, ALAN BRANDT, Johns Hopkins U. Applied Physics Lab — There are virtually no data on wake turbulence for Reynolds numbers (Re) of one million or larger, above the drag crisis, even though aircraft and ships operate at  $\text{Re} \gg 10^6$ . This study seeks to characterize the near-field of a stratified wake at large  $\text{Re} \sim 2 \times 10^5 - 1.4 \times 10^6$ , by towing a large diameter ( $\sim 0.5$  m) sphere through a thermally stratified lake and a thermally stratified large salt water tow tank. The stratification produced BV frequencies,  $N$ , up to  $0.07 \text{ s}^{-1}$  with Froude numbers  $F = U/ND \geq 15$ . Three component turbulent velocity and temperature measurements were obtained using Acoustic Doppler Velocimeters (ADV) and an array of fast response thermistors at various downstream distances. Wake turbulence characteristics including rms velocity and temperature fluctuation spectra, dissipation, integral scales, and Reynolds stresses are presented. Velocity and temperature power spectra exhibit clear  $-5/3$  slopes while velocity co-spectra and transverse spectra exhibit  $-7/3$  slopes over order-of-magnitude ranges in wavenumber, which are generally not clearly evident for lower Re laboratory experiments.

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