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High Reynolds Number Near-Field Stratified Wake Measurements behind a Sphere[1] KENNETH KALUMUCK, ALAN BRANDT, KARA SHIPLEY, MICHAEL JOZKOWSKI, Johns Hopkins Univ. Applied Physics Laboratory — To characterize the near-field of a stratified wake at Reynolds numbers, Re $\sim$ 2 x 10^5 - 10^6, experiments are being conducted in a thermally stratified fresh water lake with large diameter (D $\sim$ 0.5 m) spheres. The submerged sphere and associated instrumentation are affixed to a frame that is towed through the lake at velocities U $\sim$ 0.5 - 2 m/s. Measurements of three components of the turbulent fluctuating and mean wake velocities are being made with Acoustic Doppler Velocimeters (ADVs), while density fluctuations (inferred from temperatures) are being made with an array of fast response thermistors. Stratification is such that BV frequencies, N, up to 50 cph (0.09 /s) can be achieved, enabling Froude numbers F=U/ND $\geq$ 10. Existing stratified near-field wake data for spheres are for Re $\sim 10^4$ and less, while only a very limited set of data under simpler unstratified conditions exists at these large Re, primarily measurements along the sphere (drag, pressure, separation) rather than wake data. Advances in CFD have enabled simulations at these high Reynolds numbers without quantitative data available for validation despite the existence of many natural and man-made systems that operate in these ranges. Here, experimental system design, results of a preliminary data set, and plans for ongoing and future work are presented.

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