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Turbulence statistics in a negatively buoyant particle plume – laboratory measurement ANKUR BORDOLOI, Los Alamos National Laboratory, LAURA CLARK, GERARDO VELIZ, MICHAEL HEATH, EVAN VARIANO, University of California Berkeley — Negatively buoyant plumes of nylon particles are investigated in quiescent salt-water solution using flow visualization and stereoscopic PIV. Particles of the size 2 mm are continuously released through a nozzle from the top inside a water tank using a screw-conveyor based release mechanism. The plume propagates downward due to gravity, and by virtue of interacting particle wakes, becomes turbulent. The two phases are refractive index matched, so that the velocity field in the interstitial fluid can be quantified using PIV. We examine the velocity fields in the fluid phase to characterize turbulence statistics, such as turbulent kinetic energy, Reynolds stresses in the fully developed region of the plume. Further, we develop an image processing method to obtain particle distribution and particle slip inside the plume. In the presentation, we will discuss these results in the light of existing literature for rising plumes of bubbles under similar experimental conditions.

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