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Low Reynolds Flow Visualization Revisited: Free-Surface and Wall Effects SHELLEY CHAN, JOSUE SZNITMAN, ALEXANDER SMITS, Princeton University — Many of the seminal experimental flow visualizations at low Reynolds number can be attributed to the pioneering works of S. Taneda. These classic investigations are still considered today benchmark visualizations and are widely used as textbook examples (Van Dyke, *An Album of Fluid Motion*, 1982). With the advent of modern quantitative flow visualization techniques, we are in a position to revisit in more detail some of the original questions posed by Taneda, including boundary effects on viscous flows surrounding objects (*J Phys Soc Jpn*, 1964). In the present talk, we conduct experimental flow visualizations around three-dimensional objects at low Reynolds number (Re=$O(10^{-3}$-$10^{-1})$). Quantitative visualizations are implemented in a tow tank using velocimetry measurements (PIV); models including cubes and spheres are submerged in a highly viscous Newtonian fluid (silicon oil, 5000x viscosity of water). Here, we discuss wall effects on velocity profiles in the near- and far-field surrounding such objects. Moreover, we interrogate the influence of the free surface of the tank on the resulting viscous flow fields. The present experimental setup offers a versatile framework to investigate a wide range of fundamental fluid mechanical problems relating flows at low Reynolds number.

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