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A Surface-Resolved DNS Study of Spherical Particles Settling In Quiescent Fluid[1] WYATT HORNE, KRISHNAN MAHESH, Univ of Minn - Minneapolis — Surface-resolved numerical simulations using moving body-fitted grids are used to study the detailed fluid physics and body motion of spheres settling in quiescent fluid. A novel unstructured overset grid method is used which provides highly resolved near surface flow information that is used to connect the particle motion directly to detailed features in the fluid flow around the particle. Cases are presented over a range of Galileo numbers (Ga) at a fixed density ratio ($m^*\approx 8$). Included are Stokesian cases where the Maxey-Riley equations accurately predict the motion of the particle and cases where vorticity is shed from the particles surface into the quiescent fluid which results in non-trivial particle trajectories. Full particle trajectories are shown and compared to previous studies along with detailed flow information in the near and far wake. The hydrodynamic forcing on particles is analyzed and connected to features in the near and far wake within the quiescent fluid.

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