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Falling Spheres in Sharply Stratified Fluids[1] RICHARD MCLAUGHLIN, ROBERTO CAMASSA, JOYCE LIN, MATTHEW MOORE, University of North Carolina, RICHARD PARKER, Universtiy of Chicago, ASWHIN VAIDYA, University of North Carolina, UNC RTG FLUIDS GROUP TEAM —
We explore the motion of heavy spheres falling through a sharp salt stratified fluid layer in which an intriguing levitation phenomena is observed: the heavy sphere experiences a transient levitation in which the sphere descends through the sharp transition, stops, and rises back into the layer before ultimately returning to descent. Careful new measurements will be presented showing how the bounce amplitude depends upon layer thickness. The hydrodynamics, which involves a strong coupling between variable density fluid, and moving solid boundary, entrained, turbulently mixed fluid, and strong internal waves will be discussed. We will discuss exact and asymptotic calculations in potential flows yielding the potential energy associated with the sharp interface which may provide an arrestment criteria for the falling sphere.

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Richard McLaughlin
University of North Carolina

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