Abstract Submitted
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Hydrodynamics of an oscillating sphere in water ROBERT HERSHBERGER, DIOGO BOLSTER, RUSSELL DONNELLY, University of Oregon — We have studied the flow patterns and damping of a one inch steel ball oscillating in water. The suspension was a 120 cm copper wire which allowed electrical connection to the water bath providing visualization by means of the Baker technique. The ball could be set into motion by means of a linear motor arranged to oscillate in the horizontal direction at the top of the suspension. Alternatively the bob could be set in motion and allowed to decay freely. The range of Reynolds numbers based on the maximum velocity ranged from <100 to over 2500 and the Carpenter-Keulegan numbers from 0.3 to 10. The period of oscillation was 2.5 sec. For Reynolds numbers up to about 400 we observed a boundary layer on the ball with a suggestion of a laminar wake spreading from the equator in the direction of oscillation. At higher Reynolds numbers around 550 we began to see periodic structure developing on the wake. By Re$\sim$700 it is clear the disturbances are a series of vortex rings which form on the rear of the sphere during an oscillation, and leapfrog over the sphere and propagate away when the direction of oscillation is reversed.

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