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Analysis of the Free Rising Sphere in Newtonian Fluid and the "Pop Off" Effect[1] ANNA SHCHETININA, JULIO GARCIA, EMMANUEL GAILLARD, LYES KADEM, HOI DICK NG, Concordia University, Montreal, Canada — In this experiment motion of a free rising sphere in Newtonian fluid is studied. Spheres of various densities and diameters are placed at the bottom of a large water tank and then released with zero initial velocity and no distortion in trajectory. The motion of the rising sphere is described in three phases: ascending, where the body undergoes constant acceleration and moves vertically while developing vortices on its both sides; transitional, where a secondary sideway motion is added and vortex shedding begins; and, finally, oscillatory, where the sphere begins to move in a sinusoidal pattern while describing even spiral trajectory. The mode in which the ball exits the water varies depending on several conditions. Depending on the Reynolds number, it escapes vertically or diagonally, which is referred to by Bourrier et al. (1984) [Eur. J. Phys. 5:225-231] as the 'pop off' effect. Using Particle Image Velocimetry (PIV), high-speed photography and image processing techniques, we discuss the causes of the oscillatory motion as well as the "pop off" effect produced by a sphere under placed conditions.

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Hoi Dick Ng
Concordia University, Montreal, Canada

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