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Experimental technique for observing free oscillation of a spherical gas bubble in highly viscous liquids. TAKEHIRO NAKAJIMA, KEITA ANDO, Department of Mechanical Engineering, Keio University — An experimental technique is developed to observe free oscillations of a spherical gas bubble in highly viscous liquids. It is demonstrated that focusing a nanosecond laser pulse of wavelength 532 nm and energy up to 1.5 mJ leads to the formation of a spherical gaseous bubble, not a vaporous bubble (quickly condensed back to the liquid), whose equilibrium radius is up to 200 microns in glycerin saturated with gases at room temperature. The subsequent free oscillations of the spherical gas bubble is visualized using a high-speed camera. Since the oscillation periods are short enough to ignore bubble translation under gravity and mass transfer out of the bubble, the observed bubble dynamics can be compared to nonlinear and linearized Reyleigh-Plesset-type calculations that account for heat conduction and acoustic radiation as well as the liquid viscosity. In this presentation, we report on the measurements with varying the viscosity and comparisons to the theory to quantify damping mechanisms in the bubble dynamics.

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