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High-speed visualization and radiated pressure measurement of a laser-induced gas bubble in glycerin-water solutions TAKEHIRO NAKAJIMA, TOMOKI KONDO, KEITA ANDO, Department of Mechanical Engineering, Keio University — We study the dynamics of a spherical gaseous bubble created by focusing a nanosecond laser pulse at 532 nm into a large volume of glycerin-water solutions. Free oscillation of the bubble and shock wave emission from the bubble dynamics are recorded by a high-speed camera together with a pulse laser stroboscope; concurrently, pressure radiated from the oscillating bubble is measured by a hydrophone. The bubble achieves a mechanical equilibrium after free oscillation is damped out; the equilibrium state stays for a while, unlike vapor bubbles. We speculate that the bubble content is mainly gases originally dissolved in the liquid (i.e., air). The bubble dynamics we observed are compared to Rayleigh-Plesset-type calculations that account for diffusive effects; the (unknown) initial pressure just after laser focusing is tuned to obtain agreement between the experiment and the calculation. Moreover, viscous effects on the shock propagation are examined with the aid of compressible Navier-Stokes simulation.

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