Combined Experimental and Theoretical Investigation of the Gas Bubble Motion in an Acoustic Field

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Abstract

The objective of this paper is to apply the combined experimental and theoretical method to investigate the various behaviors of gas bubbles in an acoustic field. In the experiments, high-speed video and ultrasonic processor are used to capture the transient evolution of gas bubble patterns, as well as velocity profiles. In the theoretical analysis, the theories of primary and secondary Bjerknes forces and buoyancy force are introduced to accurately demonstrate the variations of bubble volume and motion. Results are presented for gas bubbles with the radius of 1.4 mm under an acoustic field with a frequency of 18 kHz, for three cases, namely single bubble rising in a quiescent liquid, acoustic single bubble oscillation and two bubbles coalescence conditions. The results show that the fragments around the single gas

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