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Measurement of Steady Streaming from an Oscillating Bubble Using Particle Image Velocimetry

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Abstract : Steady streaming flow fields induced by a 500 um bubble oscillating at 12 kHz were measured using microscopic particle image velocimetry (PIV). The accuracy of velocity measurement using a micro PIV system was checked by comparing the measured velocity fields with the theoretical velocity profiles in fully developed laminar flow. The steady streaming flow velocities were measured in the saggital plane of the bubble attached on the wall. Measured velocity fields showed upward jet flow with two symmetric counter-rotating vortices, and the maximum streaming velocity was about 12 mm/s, which was within the velocity ranges measured by other researchers. The measured streamlines were compared with the analytic solution, and they also showed a reasonable agreement.

Keywords : oscillating bubble, particle image velocimetry, microstreaming, vortices,
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