Session 4aBB

Biomedical Ultrasound/Bioresponse to Vibration and Physical Acoustics: Biological Effects and Medical Applications of Stable Cavitation I

R. Glynn Holt, Chair
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Chair's Introduction—8:35

Invited Papers

9:00

4aBB2. Cavitation microstreaming patterns in single and multiple bubble systems. Andrew Ooi, Paul Tho (The Univ. of Melbourne, Parkville, Victoria 3010, Australia), and Richard Manasseh (CSIRO Manufacturing and Infrastructure Technol., Highett, Victoria 3190, Australia)

Cavitation microstreaming is a well-known phenomenon, yet there are very few flow visualizations or measurements of the velocity fields. In this talk, results from micro-particle image velocimetry measurements and streak photography, illustrating the flow field around a single and multiple oscillating bubbles resting on a solid boundary, will be presented. The different modes of bubble oscillations were also measured in terms of the variation in the radius of the bubble and the movement of the bubbles centroid so that the streaming flow field could be accurately related to the bubble motion. Thus, the resulting flow field can be correlated with the different vibration (volumetric, translating, and orbiting) modes. The flow field resulting from these oscillation modes contains closed streamlines, representing vortical regions in the vicinity of the bubble. Despite some inconsistencies, there is general agreement between these streaming patterns and those found in existing theoretical models. In addition, shape mode oscillations of single bubbles, as well as several different cases of multiple bubbles simultaneously oscillating with the same frequency and phase, were also investigated and show a rich variety of streaming patterns.

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