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# Rod-shaped cavitation bubble structure in ultrasonic field

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## Abstract

Rod-shaped cavitation bubble structure in thin liquid layers in ultrasonic field is investigated experimentally. It is found that cavitation structure successively experiences several stages with the change of the thickness of the thin liquid layer. Rod-shaped structure is a stable structure of the boundary between the cavitation cloud region and the non-cavitation liquid region, which can be formed in two different ways. Cavitation bubbles in a thin liquid layer have a distribution in the thickness direction. The rod-shaped structures tend to crosslink with each other to form stable Y-branch structures. The angle of the Y-branch structure is Gauss distribution with mathematical expectation $\mu$ = 119.93. A special rod-shaped cavitation structure with source is also investigated in detail. Due to the pressure gradient in the normal direction, the primary Bjerknes force causes the bubbles in the rod-shaped structure on both sides to converge to the axis. The secondary Bjerknes forces between the bubbles also make the cluster converge, so the large bubbles which are attached to the radiating surface tend to align themselves along the central line. According to the formula deduced in this paper, the variation of curvature of curved rod-shaped structure is qualitatively analyzed. The Y-branch structure of cavitation cloud and Plateau boundary of soap bubbles are compared.