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Flow patterns of microbubble streaming in microfluidic settings
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— Steady streaming flows from oscillating microbubbles have demonstrated a number of promising applications in microfluidics, including manipulating microparticles, mixing enhancement, transporting liquid and lysing vesicles. Earlier experimental studies have shown that oscillating bubbles located on or close to solid boundaries produce a variety of streaming flow patterns, such as "fountain" and "anti-fountain" flows. These flow patterns depend on the viscosity of the liquid, and on the driven frequency and amplitude. Here we take advantage of the micro-fabrication technology to create microbubbles of controlled size, position and also with different exposure to solid boundaries to study bubble streaming. Our new experimental results show that the flow topology depends not only on the frequency and amplitude, but also significantly on the solid boundaries near the bubbles. The findings are of importance towards the fundamental understanding of bubble streaming flows and helpful on guiding practical microfluidic device designs as well.

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