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Steering Microbubbles in Physiologically Realistic Flows Using the Bjerknes Force ALICIA CLARK, ALBERTO ALISEDA, University of Washington — Ultrasound contrast agents (UCAs) are lipid-coated microbubbles that are used to increase contrast in ultrasound imaging due to their ability to scatter sound. Additionally, UCAs can be used in conjunction with ultrasound in medical applications such as targeted drug delivery and thrombolysis. These applications utilize the Bjerknes force, an ultrasound-induced force caused by the phase difference between the incoming ultrasound pressure wave and the microbubble volume oscillations. The dynamics of microbubbles under ultrasound excitation have been studied thoroughly in stagnant fluid baths; however, understanding of the fundamental physics of microbubbles in physiologically realistic flows is lacking. An *in vitro* experiment that reproduces the dynamics (Reynolds and Womersley numbers) of a medium-sized blood vessel was used to explore the behavior of microbubbles. Using Lagrangian tracking, the trajectory of each individual bubble was reconstructed using information obtained from high speed imaging. The balance of hydrodynamic forces (lift, drag, added mass, etc.) against the primary Bjerknes force was analyzed. The results show that an increase in ultrasound pulse repetition frequency leads to a linear increase in the Bjerknes force and the increase in the force is quadratic with the amplitude of the excitation.

Alicia Clark
University of Washington

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