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Size-based sorting of micro-particles using microbubble streaming CHENG WANG, SHREYAS JALIKOP, SASCHA HILGENFELDT, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign — Oscillating microbubbles driven by ultrasound have shown great potential in microfluidic applications, such as transporting particles and promoting mixing [1-3]. The oscillations generate secondary steady streaming that can also trap particles. We use the streaming to develop a method of sorting particles of different sizes in an initially well-mixed solution. The solution is fed into a channel consisting of bubbles placed periodically along a side wall. When the bubbles are excited by an ultrasound piezo-electric transducer to produce steady streaming, the flow field is altered by the presence of the particles. This effect is dependent on particle size and results in size-based sorting of the particles. The effectiveness of the separation depends on the dimensions of the bubbles and particles as well as on the ultrasound frequency. Our experimental studies are aimed at a better understanding of the design and control of effective microfluidic separating devices. Ref: [1] P. Marmottant and S. Hilgenfeldt, Nature 423, 153 (2003). [2] P. Marmottant and S. Hilgenfeldt, Proc. Natl. Acad. Science USA, 101, 9523 (2004). [3] P. Marmottant, J.-P. Raven, H. Gardeniers, J. G. Bomer, and S. Hilgenfeldt, J. Fluid Mech., vol.568, 109 (2006).

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