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Size-sensitive particle trajectories in three-dimensional microbubble acoustic streaming flows ANDREAS VOLK, MASSIMILIANO ROSSI, Bundeswehr University Munich, SASCHA HILGENFELDT, BHARGAV RALLABANDI, University of Illinois at Urbana-Champaign, CHRISTIAN KÄHLER, ALVARO MARIN, Bundeswehr University Munich — Oscillating microbubbles generate steady streaming flows with interesting features and promising applications for microparticle manipulation. The flow around oscillating semi-cylindrical bubbles has been typically assumed to be independent of the axial coordinate. However, it has been recently revealed that particle motion is strongly three-dimensional [A. Marin *et al.*, Phys. Rev. Appl. 3, 041001, (2015); Rallabandi *et al.*, J. Fluid Mech. 777, (2015)]: Small tracer particles follow vortical trajectories with pronounced axial displacements near the bubble, weaving a toroidal stream-surface. A well-known consequence of bubble streaming flows is size-dependent particle migration [C. Wang *et al.*, Biomicrofluidics (2012)], which can be exploited for sorting and trapping of microparticles in microfluidic devices. In this talk, we will show how the three-dimensional toroidal topology found for small tracer particles is modified as the particle size increases up to 1/3 of the bubble radius. Our results show size-sensitive particle positioning along the axis of the semi-cylindrical bubble. In order to analyze the three-dimensional sorting and trapping capabilities of the system, experiments with an imposed flow and polydisperse particle solutions are also shown.

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