Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Microstreaming from Sessile Semicylindrical Bubbles SASCHA HILGENFELDT, BHARGAV RALLABANDI, LIN GUO, CHENG WANG[1], Mechanical Science and Engineering, University of Illinois at Urbana-Champaign —
Powerful steady streaming flows result from the ultrasonic driving of microbubbles, in particular when these bubbles have semicylindrical cross section and are positioned in contact with a microfluidic channel wall. We have used this streaming in experiment to develop novel methods for trapping and sorting of microparticles by size, as well as for micromixing [1,2]. Theoretically, we arrive at an analytical description of the streaming flow field through an asymptotic computation that, for the first time, reconciles the boundary layers around the bubble and along the substrate wall, and also takes into account the oscillation modes of the bubble. This approach gives insight into changes in the streaming pattern with bubble size and driving frequency, including a reversal of the flow direction at high frequencies with potentially useful applications [3].

[1] C. Wang, S.Jalikop, and S.Hilgenfeldt, Appl. Phys. Lett. 99, 034101 (2011).
[2] C. Wang, B.Rallabandi, and S.Hilgenfeldt, Phys. Fluids 25, 022002 (2013).
[3] B.Rallabandi, C.Wang, and S.Hilgenfeldt, J. Fluid Mech., in press (2013).

[1]present address: Mechanical and Aerospace Engineering, Missouri S&T

Sascha Hilgenfeldt
University of Illinois at Urbana-Champaign

Date submitted: 15 Nov 2013 Electronic form version 1.4