Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Microbubbles as drug-delivery vectors: steering ultrasound contrast agents in arterial flow using the Bjerknes force[1] ALBERTO ALISEDA, ALICIA CLARK, University of Washington Department of Mechanical Engineering — Micron-sized coated microbubbles, commonly referred to as ultrasound contrast agents (UCAs), have been identified as potential targeted drug delivery vectors with applications in cancer chemotherapy and thrombolysis. The Bjerknes force, produced by the fluctuating pressure field created by the ultrasound waves acting on the oscillating bubble with a phase lag induced by the liquid's inertia and viscosity, can be used to direct the microbubbles to specific targeted areas in the circulatory system. While this phenomenon is well understood in a quiescent fluid, we need a better understanding of the dynamics of microbubbles in the complex pulsatile flow found in the human circulatory system. The non-linear interactions of ultrasound volume oscillations and flow-induced stresses are explored via high speed imaging of UCAs under in vitro flow that reproduces conditions in large arteries (relatively high Reynolds and Womersley numbers). This improved understanding will be used to manipulate and steer UCAs with ultrasound, in conjunction with hydrodynamic forces.

[1]NSF CAREER, NSF Graduate Research Fellowship

Alicia Clark
University of Washington Department of Mechanical Engineering

Date submitted: 09 Aug 2012 Electronic form version 1.4