Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

**Bacterial locomotion in a wall bounded shear flow** JIAN SHENG, Aerospace Engineering and Mechanics, University of Minnesota, ROMAN STOCKER, Massachusetts Institute of Technology, MEHDI MOALEI, Aerospace Engineering and Mechanics, University of Minnesota — Statistically robust experimental observations on swimming characteristics of bacteria in a wall bounded shear flow are crucial for understanding cell attachment and detachment, interfacial rheology during the initial formation of a biofilm. We combined microfluidics and holography to measure 3-D trajectories of *E. coli* (AW405), subjecting to a carefully controlled shear flow. Experiments are conducted in a straight micro-channel of 40x3x0.2 mm, latter being the depth, with the maximum shear rates up to 200 $s^{-1}$. Holographic microscopic movies recorded at 40X magnification and 15 fps are streamed in real time to a data acquisition computer for an extended period of time (>20 min) that allows us to examine long term shear responses. Three-dimensional locations and orientations of bacterial are extracted with a resolution of 0.185 $\mu$m in lateral directions and 0.5 $\mu$m in the wall normal direction. The 3-D trajectories are tracked by an in-house developed particle tracking algorithm. Over thousand 3-D trajectories over a sample volume of 380×380×200 $\mu$m have been obtained. Ongoing analysis focuses on the effects of flow on cell migration and attachment near a sheared surface.

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Date submitted: 12 Sep 2011 Electronic form version 1.4