Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Size-differentiated lateral migration of bubbles in Couette flow of two-dimensional foam HADI MOHAMMADIGOUSHKI, JAMES J. FENG, Department of Chemical and Biological Engineering, University of British Columbia — In this Talk, we report experiments on lateral migration of bubbles in a two-dimensional foam sheared in a narrow-gap Couette device. A larger bubble in an otherwise monodisperse bubble raft migrates toward the center of the gap as long as the bubble size ratio and the shear rate are each above a threshold. The migration speed is roughly two orders of magnitude higher than that of a single bubble, and increases with the shear rate and the size ratio. The bubble also deforms much more than an isolated one at the same shear rate. Modifying the Chan-Leal solution for the migration of a single submerged bubble or drop, we derive a formula that successfully predicts all the migration trajectories recorded in the experiment. The threshold for migration corresponds to the wall repulsion force overcoming the capillary force in the 2D foam. The size-differentiated bubble migration provides an explanation for previously observed size segregation in sheared 3D polydisperse foams.

Hadi Mohammadigoushki
Department of Chemical and Biological Engineering,
University of British Columbia

Date submitted: 10 Aug 2012 Electronic form version 1.4