Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Coupling of the interfacial and bulk flow in a knife-edge surface viscometer[1] ADITYA RAGHUNANDAN, CHRISTOPHER TILGER, AMIR HIRSA, Rensselaer Polytechnic Institute, JUAN LOPEZ, Arizona State University — After more than 50 years of investigating how to measure surface (excess) shear viscosity, it remains a controversial issue. The complications stem from the fact that to measure a viscous response the system needs to be flowing, and for a surface film on a liquid substrate this means that the liquid in the bulk will also be flowing. Macroscale measurements, which generally provide greater accuracy, are often made at Reynolds numbers that are large enough for inertia to be non-negligible. However the theoretical models against which the measurements are compared have so far failed to properly account for the coupling. Results will be presented from a numerical study on the coupling between the interfacial and bulk flow. Also, experimental results will be presented for the lung surfactant component DPPC.

[1]NASA grant NNX13AQ22G, NSF grants CBET-1064644 and CBET-1064498

Amir Hirsa
Rensselaer Polytechnic Institute

Date submitted: 30 Jul 2014 Electronic form version 1.4