Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Dynamics of a Disturbed Sessile Drop measured by AFM[1] PATRICIA MCGUIGGAN, DANIEL GRAVE, Johns Hopkins University, JAY WALLACE, MACS Consulting, SHENGFENG CHENG, Sandia National Laboratories, ANDREA PROSPERETTI, MARK ROBBINS, Johns Hopkins University — A new method for studying the dynamics of a sessile drop by atomic force microscopy (AFM) is demonstrated. A hydrophobic microsphere (radius, r =20 micrometers) is brought into contact with a small sessile drop resting on a hydrophobic surface. When the microsphere touches the liquid surface, the meniscus rises onto the microsphere due to capillary forces. Although the microsphere volume is six orders of magnitude smaller than the drop, it excites the lowest normal resonance modes of the liquid interface. The sphere is pinned at the interface whose small (less than 100 nm) oscillations are readily measured with the AFM. Resonance oscillation frequencies were measured for drop volumes between 5 microL and 200 microL. The results for the two lowest normal modes are quantitatively consistent with continuum calculations for resonance of hemispherical drops with no adjustable parameters. The method may enable sensitive measurements of volume, surface tension and viscosity of small drops.

[1]Supported by the 3M non-tenured Faculty Grant and the National Science Foundation under Grant No. 0709187.

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Date submitted: 05 Aug 2011 Electronic form version 1.4