Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Investigation of Contact Angle Behavior and Stability of Drops to Airflow Forcing on Rough Surfaces JASON SCHMUCKER, EDWARD WHITE, Texas A&M University — A method for measuring full-field, instantaneous drop interface profiles on rough surfaces has been implemented to study contact angles and stability to wind forcing on metallic surfaces with micron-scale roughness. Wind tunnel experiments are conducted to produce criteria for runback of drops and set these thresholds for measured water drops spanning a range of Bond numbers from $Bo = 0.5$ to 5 on roughness in the range of $R_A = 0.8$ to 4.9 with drop based Reynolds numbers spanning an order of magnitude. More importantly, these stability limits are tested with particular care taken to observe their relation to the behavior of both the contact line and contact angle distribution as the drop adjusts its configuration to find a stable condition until it is no longer able to do so and is blown downstream. Results such as critical shear rates and contact angles are discussed and compared with previous numerical studies in the literature such as Dimitrakopoulos [J.Fluid.Mech. 580, 2007] and Ding and Spelt [J.Coll.Sci. 599, 2008] along with experimental results such as Milne [Langmuir 25:24, 2009].

Jason Schmucker
Texas A&M University

Date submitted: 05 Aug 2011 Electronic form version 1.4