Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

The Dynamics of Free-Surface Liquid Jet Impingement on Superhydrophobic Surfaces ZACHARY COLLINS, DANIEL MAYNES, BRENT WEBB, Brigham Young University — We report experimental results characterizing the dynamics of a liquid jet impinging normally on superhydrophobic surfaces spanning the Weber number ($We = \rho V^2 D/\sigma$) range from 100 to 1400. The superhydrophobic surfaces are fabricated with micro-ribs and cavities that are subsequently coated with a hydrophobic coating. The hydraulic jump diameter is measured using digital photography in directions both parallel and transverse to the orientation of the ribs and cavities and it exhibits an elliptical shape. In general, the major axis of the elliptical hydraulic jump is aligned parallel to the micro-ribs and cavities. For comparison, measurements were acquired for surfaces with ribs and cavities that were not coated, and for smooth surfaces with and without a hydrophobic coating. Surfaces exhibiting a range of micro-rib and cavity widths and depths were employed. The hydrophobicity of the different surfaces was characterized by the interfacial contact angle between a water droplet and the surface. Results are presented as qualitative descriptions of the impingement behavior, including droplet formation, and quantitative characterizations of the relative diameter of the hydraulic jump. In general the relative hydraulic jump diameter varies as We^n, where the exponent $n(0< n <1)$ varies with surface characteristics and the relative diameter of the hydraulic jump decreases with increasing surface hydrophobicity.

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Date submitted: 04 Aug 2008 Electronic form version 1.4