Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Predicting Stability of Air–Water Interface on Superhydrophobic Surfaces[1] B. EMAMI, H. VAHEDI TAFRESHI, M. GAD-EL-HAK, G.C. TEPPER, Virginia Commonwealth University — In this work, two different methodologies for predicting the stability of the air-water interface on submerged superhydrophobic surfaces are presented. The first method is an analytical approach developed by balancing the hydrostatic pressure with the capillary forces over the interface, and results in a second-order partial differential equation. The solution to this equation provides the 3-D interface shape and the critical pressure beyond which the superhydrophobic surface departs from the Cassie state. The second method presented here is an approximate numerical technique based on the so called Full Morphology method in which the Young–Laplace equation is used to relate a capillary pressure to the most constricted opening of the pore space between the peaks of the surface roughness. Predictions of the methods presented in this study are compared with the available studies in the literature (*Applied Physics Letters* **98**:20, 203106, 2011).

[1]Financial support from DARPA, contract number W91CRB-10-1-0003, is acknowledged.

Mohamed Gad-el-Hak
Virginia Commonwealth University

Date submitted: 22 Jun 2011 Electronic form version 1.4