Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Effect of slip on vortex dynamics and forcing of a superhydrophobic cylinder PRANESH MURALIDHAR, ROBERT DANIELLO, NANGELIE FERRER, JONATHAN ROTHSTEIN — Superhydrophobic surfaces have been shown to produce significant drag reduction for both laminar and turbulent flows of water through large and small-scale channels. In this presentation, a series of experiments will be presented which investigate the effect of superhydrophobic-induced slip on the vortex dynamics in the wake of a cylinder and the change in the drag and lift forces thereof. In these experiments, circular cylinders are coated with a series of superhydrophobic surfaces fabricated from PDMS with well-defined micron-sized patterns of surface roughness. Using force measurements and PIV (Particle Image Velocimetry), we will show that these surfaces have a noticeable effect on the drag/lift and vortex dynamics of cylinders. When compared to a smooth, no-slip cylinder, we will show that the lift/drag and the amount of raw vorticity that is shed in the wake of the superhydrophobic cylinder decreases. In addition, we will show that the forcing is sensitive to changes of feature spacing, size and orientation.

Pranesh Muralidhar
University of Massachusetts Amherst

Date submitted: 03 Aug 2011 Electronic form version 1.4