Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

**Interaction of a vortex ring and a bubble** NARSING K. JHA, RAGHURAMAN N. GOVARDHAN, Indian Institute of Science — Micro-bubble injection in to boundary layers is one possible method for reducing frictional drag of ships. Although this has been studied for some time, the physical mechanisms responsible for drag reduction using microbubbles in turbulent boundary layers is not yet fully understood. Previous studies suggest that bubble-vortical structure interaction seems to be one of the important physical mechanisms for frictional drag reduction using microbubbles. In the present work, we study a simplification of this problem, namely, the interaction of a single vortical structure, in particular a vortex ring, with a single bubble for better understanding of the physics. The vortex ring is generated using a piston-cylinder arrangement and the bubble is generated by connecting a capillary to an air pump. The bubble dynamics is directly visualized using a high speed camera, while the vorticity modification is measured using time resolved PIV. The results show that significant deformations can occur of both the bubble and the vortex ring. Effect of different non-dimensional parameters on the interaction will be presented in the meeting.

Raghuraman N. Govardhan
Indian Institute of Science

Date submitted: 31 Jul 2014 Electronic form version 1.4