Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Fragment size distribution in viscous bag breakup of a drop VARUN KULKARNI, Purdue University, KARTIK V. BULUSU, MICHAEL W. PLESNIAK, The George Washington University, PAUL E. SOJKA, Purdue University — In this study we examine the drop size distribution resulting from the fragmentation of a single drop in the presence of a continuous air jet. Specifically, we study the effect of Weber number, We, and Ohnesorge number, Oh on the disintegration process. The regime of breakup considered is observed between $12 \leq We \leq 16$ for $Oh \leq 0.1$. Experiments are conducted using phase Doppler anemometry. Both the number and volume fragment size probability distributions are plotted. The volume probability distribution revealed a bi-modal behavior with two distinct peaks: one corresponding to the rim fragments and the other to the bag fragments. This behavior was suppressed in the number probability distribution. Additionally, we employ an in-house particle detection code to isolate the rim fragment size distribution from the total probability distributions. Our experiments showed that the bag fragments are smaller in diameter and larger in number, while the rim fragments are larger in diameter and smaller in number. Furthermore, with increasing We for a given Oh we observe a large number of small-diameter drops and small number of large-diameter drops. On the other hand, with increasing Oh for a fixed We the opposite is seen.

Varun Kulkarni
Purdue University

Date submitted: 01 Aug 2015 Electronic form version 1.4