Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Flapping dynamics of a thin liquid sheet VADIVUKKARASAN M, DHIVYARAJA KUMARAN, MAHESH PANCHAGNULA, Indian Inst of Tech-Madras, MULTI-PHASE FLOW PHYSICS GROUP TEAM — We attempt to delineate and describe the complete evolution of a thin soap film when air is blown through a nozzle in the normal direction. The sequence of events and its intrinsic dynamics are captured using high speed imaging. By careful observation, it was observed that multiple mechanisms occur in the same system and each event is triggered by an independent mechanism. The events include (a) flapping of a liquid sheet and pinching of the bubble, (b) onset of rupture on the liquid sheet, (c) formation of ligaments and (d) ejection of drops. From this study, it is shown that these events are predominantly governed by Kelvin-Helmholtz instability, Taylor - Culick law, Rayleigh-Taylor instability and capillary instability, respectively. The present experiments can be considered as an extension to the previous studies on soap films [L. Salkin, A. Schmit, P. Panizza, and L. Courbin, Phys. Rev. Lett.116, 077801 (2016)] as well as thin flapping sheets [H. Lhuissier and E. Villermaux, Phys. Rev. Lett. **103**, 054501 (2009)] which has direct relevance to coaxial atomizers used in aircraft applications.

Mahesh Panchagnula
Indian Inst of Tech-Madras

Date submitted: 01 Aug 2017 Electronic form version 1.4