Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Experimental investigation of the stability of a moving radial liquid sheet[1] MANJULA PARAMATI, MAHESH TIRUMKUDULU, Department of Chemical Engineering, Indian Institute of Technology Bombay, Powai, Mumbai - 400076. India — Experiments were conducted to understand the stability of moving radial liquid sheets formed by the head-on impingement of two co-linear water jets using laser induced fluorescence technique (LIF). Acoustic sinusoidal fluctuations were introduced at the jet impingement point and we measured the displacement of the center line of the liquid sheet (sinuous mode) and the thickness variation (varicose mode) of the disturbed liquid sheet. Our experiments show that the sinuous disturbances grow as they are convected outward in the radial direction even in the smooth regime (We $<$ 800). In the absence of the acoustic forcing, the measured thickness has the expected 1/r dependence. Interestingly, we were unable to detect any thickness variation about the pre-stimulus values in the presence of acoustic forcing suggesting that the variation in the thickness is lower than the resolution of the technique ($\pm$ 1 μm). The growth rates of the sinuous mode determined from the wave envelope matches with the prediction of a recent theory by Tirumkudulu and Paramati (Communicated to Phys. Of Fluids, 2013) which accounts for the inertia of the liquid phase and the surface tension force in a radial liquid sheet while neglecting the inertial effects due to the surrounding gas phase.

[1]The authors acknowledge the financial assistance from Indo-French Center for Promotion of Advanced Research and also Indian institute of technology Bombay.

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Date submitted: 01 Aug 2013 Electronic form version 1.4