Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

3D analysis of liquid jet break-up from high-speed synchronized videos BRADEN MCDERMOTT, TIMOTHY SHEDD, University of Wisconsin-Madison, MAY CORN, MARCO ARIENTI, MARIOS SOTERIOU, United Technologies Research Center — The role played by the air stream in selecting the dominant wave mode in liquid jet in crossflow break-up is investigated in an experimental facility where a rectangular air jet is directed orthogonally toward the liquid column. The column is seen to immediately broaden upon impact of the air jet, with surface waves initiating along the windward surface. The ensuing break-up dynamics is captured by two synchronized high-speed cameras with identical lenses and orthogonal fields of view. The side view of the windward surface shows a wavelike structure whose peaks correspond, in the top view of the column, to transverse ligaments that increase in length with distance. The wave troughs correspond to thin sheets which distend, stretch, and eventually perforate into smaller droplets leaving behind the thicker transverse ligaments. The coherent structures of this complex dynamics are revealed by the simultaneous analysis of the two synchronized image sequences in a range of turbulent and non-turbulent flow conditions. Three-dimensional reconstruction aspects will be discussed, particularly how to identify the dominant wavelike modes that appear periodically in the video sequences.

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Date submitted: 05 Aug 2008 Electronic form version 1.4