Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Droplet and Slug Detachment and Entrainment in Microchannel Gas Flows BRIAN ROBINSON, BRIAN CARROLL, CARLOS HIDROVO, The University of Texas at Austin — Liquid droplet and slug dynamics in a confined microchannel high speed gas flow is an important phenomenon with applications in two-phase micromixers, spray cooling for point source heat rejection, and water management in proton exchange membrane fuel cells. Thus, the ability to understand, predict, and control droplet growth, detachment, entrainment, and possible breakup is crucial. When subjected to a gas flow in a standard T-junction arrangement, experimental studies have shown that droplet and slug detached characteristics are determined by the gas Reynolds number, site geometry, and liquid/solid interfacial tension. Increasing the gas Reynolds number reduces the volume of the detached droplets and slugs while injection geometry and interfacial tension influence droplet and slug tail growth and formation of liquid films. Additionally, droplets can grow and detach with and without contact with adjacent channel walls due to site contaminants, geometry imperfections, and surface treatments, thereby adding complexity to the detachment process.

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Date submitted: 06 Aug 2010 Electronic form version 1.4