Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Two-Component Velocity Measurements of the Flow over a Backward Facing Step within a Microchannel using Molecular Tagging Velocimetry[1] CHEE LUM, MANOOCHEHR KOOCHESFAHANI, Department of Mechanical Engineering, Michigan State University — Flow over a backward facing step at macro scales has been extensively studied in the past. The micro-scale counterpart of this flow has received less attention, however. In this work we investigate the flow over a micro step as a possible geometric configuration useful for enhanced chemical mixing and detection caused by a longer flow residence time within the recirculation zone. The geometry considered here consists of a microchannel with a gap height of 170 microns that expands to a gap height of 340 microns after a step. Measurements are based on molecular tagging velocimetry (MTV) using phosphorescent supramolecules as molecular tracers. Past applications of MTV in microflows have utilized line tagging for obtaining velocity data in primarily unidirectional flows, an approach this is not suitable for the flow studied here. We use tagging by a grid of intersecting laser lines to measure two components of the velocity field over a plane. Velocity fields before, at, and after the step will be presented for different flow rates, allowing the determination of the flow characteristics in the presence of a step.

[1]This work was supported by the CRC Program of the National Science Foundation, Grant Number CHE-0209898.

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Date submitted: 04 Aug 2006 Electronic form version 1.4