Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Multilayer Nano-Particle Image Velocimetry in Microscale Poiseuille Flows HAIFENG LI, MINAMI YODA, Georgia Institute of Technology — In multilayer nano-particle image velocimetry (mnPIV), fluorescent colloidal tracers are illuminated by evanescent waves with an intensity that decays exponentially along z, or the direction normal to the wall. Multilayer nPIV exploits the non-uniform nature of this illumination, binning the tracers in "standard" evanescent wave PIV images into a few sub-images at different z based upon tracer image intensities. These sub-images are then processed to extract the velocity components parallel to the wall at distinct z-locations within about 400 nm of the wall. Although the feasibility of this technique has already been demonstrated using synthetic images of plane Couette flow [Li *et al.* (2006) *Exp Fluids*, **41**, 185], we present here results from experimental images. Velocity profiles obtained from three sub-images in Poiseuille flow through rectangular 40 μm $\times$ 300 μm microchannels will be presented for pressure gradients up to about 1 Bar/m. The two mnPIV points farthest from the wall are used to estimate velocity gradients (and hence wall shear stresses). The accuracy of the mnPIV velocity gradient results is discussed.

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Date submitted: 30 Jul 2007 Electronic form version 1.4