Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Experimental evidence of 3D flows around corners at low Reynolds number JOSUE SZNITMAN, DAVID CLIFTON, DEXTER SCOBEE, HOWARD STONE, ALEXANDER SMITS, Princeton University — Recently, Rusconi et al. (*J R Soc Interface*, 2010) have observed the formation of suspended filamentous biofilms in the middle plane of curved microchannels under laminar flow conditions. Motivated by such findings, we investigate experimentally the structure of 3D bounded viscous flows in the proximity of corners, at low Reynolds numbers ($Re < 0.01$). Beyond the location of the corner, shear driven flows are geometrically confined within rectangular-like channels of varying aspect ratios. Characteristic flows are experimentally generated using dynamic similarity in a tow-tank filled with a highly viscous silicon oil. Quantitative flow measurements are obtained using PIV; regions of interest are interrogated by scanning a series of 2D planes in the vicinity of the corner. Past the corner, flows are predominantly uniaxial along the ductal length. However, near the corner, there exists a weak yet well-defined vortical flow structure; this secondary motion is experimentally observed via the deflection of PIV velocity vectors in the spanwise flow direction. Such flow structure yields a net steady-state flow focusing effect in the middle of the duct plane; the structure and strength of such focusing effect are discussed in the present talk.

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Date submitted: 09 Aug 2010 Electronic form version 1.4