Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Nonlinear electrokinetic repulsion effects in combined electroosmotic and Poiseuille flow through microchannels[1] NECMETTIN CEVHERI, MINAMI YODA, Georgia Institute of Technology — Recent evanescent-wave particle velocimetry studies in electrokinetically driven flow where aqueous solutions are driven by an electric field of magnitude E, have shown that the radius $a = O(0.1\text{-}1$ μm) particle tracers suspended in the solution are subject to a wall-normal force that drives particles away from the wall [Kazoe & Yoda, *Langmuir* **27**:11481]. The magnitude of this force appears to scale as E^2 and a^2, albeit over a limited range of E and a, suggesting that particles of different sizes will have different average wall-normal positions, and hence sample different velocity distributions in a shear flow. To verify this hypothesis, evanescent-wave particle velocimetry was used to measure near-wall particle distributions and velocities of $a = 0.2$ μm and 0.5 μm particles in the combined electroosmotic and Poiseuille flow of a bidisperse dilute aqueous solution through fused-silica channels about 30 μm deep for $E < 45$ V/cm and pressure gradients $\Delta p/L \leq 1.3$Bar/m. To evaluate the whether this nonlinear electrokinetic force can be used separate particles based on their size, near-wall particle distributions for both particle sizes were measured at different streamwise locations in the combined flow.

[1]Supported by ARO and NSF

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Date submitted: 03 Aug 2012 Electronic form version 1.4