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Nonuniform particle distributions in near-wall particle-image velocimetry[1] HAIFENG LI, MINAMI YODA, Georgia Institute of Technology — Multilayer nano-particle image velocimetry (MnPIV) uses fluorescent colloidal tracers illuminated by evanescent waves to visualize the flow within the first 500 nm next to the wall. Because the evanescent-wave intensity decays exponentially with wall-normal distance z, the z- position of each tracer particle can be correlated to the intensity of its image, assuming that the particle image and illumination intensities behave in a similar fashion. Recent experimental calibrations suggests that the z-position of 100 nm fluorescent polystyrene spheres can be determined with an accuracy of about 20 nm [Li & Yoda (2008) *Meas. Sci. Technol.* **19**, 075402]. Near-wall particle distributions were obtained as a function of z for the Poiseuille flow of monovalent electrolyte solutions at various pH and ionic strengths through bare hydrophilic and coated hydrophobic fused- quartz microchannels with similar nominally rectangular cross- sections. The tracers were then divided into three sublayers, each containing about 1/3 of the particles, based on the measured particle distribution, and the average velocities in each layer were placed at the average z-position sampled by the particles in that layer. The effect of pH and wall properties on the near-wall particle distributions and the resultant MnPIV data is discussed.

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