Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Measurement bias in intensity-based near-surface particle velocimetry due to tracer size variations WEI WANG, Binghamton University, JEFFREY GUASTO, Massachusetts Institute of Technology, PETER HUANG, Binghamton University — Near-surface particle-based velocimetry using evanescent wave microscopy has gained popularity for experimental studies in biophysical transport and nanofluidics. This technique is capable of measuring the 3D motion of small fluorescent tracer particles (10 nm to 10 micron) within a few hundred nanometers of a liquid-solid interface. Particle intensity is mapped to distance from the interface using the monotonic decay of the evanescent wave. In this work, we consider the measurement bias introduced by polydisperse tracer particle size on the measured spatial distribution of particles and their implications for nano-scale velocimetry. We present a general model to account for particle size variation and the associated interaction potentials between tracer particles and the solid interface (e.g. electrostatic and van der Waals forces) under typical experimental conditions.

Peter Huang
Binghamton University

Date submitted: 05 Aug 2010

Electronic form version 1.4