Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Study of Influence of Experimental Technique on Measured Particle Velocity Distributions in Fluidized Bed BALAJI GOPALAN, West Virginia University Research Corporation / National Energy Technology Laboratory, FRANK SHAFFER, National Energy Technology Laboratory — Fluid flows that are loaded with high concentration of solid particles are common in oil and chemical processing industries. However, the opaque nature of the flow fields and the complex nature of the flow have hampered the experimental and computational study of these processes. This has led to the development of a number of customized experimental techniques for high concentration particle flows for evaluation and improvement of CFD models. This includes techniques that track few individual particles, measures average particle velocity over a small sample volume and those over a large sample volume. In this work novel high speed PIV (HsPIV), with individual particle tracking, was utilized to measure velocities of individual particles in gas-particle flow fields at the walls circulating and bubbling fluidized bed. The HsPIV measurement technique has the ability to simultaneously recognize and track thousands of individual particles in flows of high particle concentration. To determine the effect of the size of the sample volume on particle velocity measurements, the PDF of Lagrangian particle velocity was compared with the PDF of Eulerian for different domain sizes over a range of flow conditions. The results will show that measured particle velocity distribution can vary from technique to technique and this bias has to be accounted in comparison with CFD simulations.

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Date submitted: 02 Aug 2013 Electronic form version 1.4