Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

The effect of the dissipation of energy on the hydrodynamics of the gas-particle fluidized beds D.J. BERGSTROM, MOHAMMAD REZA HAGHGOO, Department of Mechanical Engineering, University of Saskatchewan, Saskatoon, SK, Canada, R.J. SPITERI, Department of Computer Science, University of Saskatchewan, Saskatoon, SK, Canada — The flow structure in dense gas-particle fluidized beds is strongly affected by the dissipation of kinetic energy through particle collisions with each other and the wall. The energy dissipation reduces the kinetic energy of the particles. Consequently, larger clusters will be formed, and this in turn leads to the formation of larger bubbles. Therefore, it is insightful to investigate the instantaneous dissipation of energy in a fluidized bed in order to have a better understanding of the hydrodynamics of the particle phase. Visualization of the dissipation term will also clarify how much the walls contribute to the dissipation of energy in the overall system. In this study, a two-fluid model is used for the numerical simulation of an engineering-scale bubbling fluidized bed. The MFiX code is used to perform the simulations. A modified SIMPLE algorithm for multiphase flows is employed that uses a higher-order discretization scheme to accurately compute bubble shapes and the deferred correction method to enhance numerical stability. The results of the three-dimensional simulation are in good agreement with the limited experimental data. The dissipation of the kinetic energy of the particles is evaluated using the model relations based on the simulated particle velocity fields.

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Date submitted: 01 Aug 2014 Electronic form version 1.4