Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Numerical simulation of turbulent slurry flows MOHAMMAD REZA HAGHGOO, Mechanical engineering Department, University of Saskatchewan, REYMOND J. SPITERI, Computer Science Department, University of Saskatchewan, DONLAD J. BERGSTROM, Mechanical engineering Department, University of Saskatchewan — Slurry flows, i.e., the flow of an agglomeration of liquid and particles, are widely employed in many industrial applications, such as hydro-transport systems, pharmaceutical batch crystallizers, and wastewater disposal. Although there are numerous studies available in the literature on turbulent gas-particle flows, the hydrodynamics of turbulent liquid-particle flows has received much less attention. In particular, the fluid-phase turbulence modulation due to the particle fluctuating motion is not yet well understood and remains challenging to model. This study reports the results of a numerical simulation of a vertically oriented slurry pipe flow using a two-fluid model based on the kinetic theory of granular flows. The particle stress model also includes the effects of frictional contact. Different turbulence modulation models are considered, and their capability to capture the characteristic features of the turbulent flow is assessed. The model predictions are validated against published experimental data and demonstrate the significant effect of the particles on the fluid-phase turbulence.

Mohammad Reza Haghgoo
Mechanical engineering Department, University of Saskatchewan

Date submitted: 29 Jul 2016 Electronic form version 1.4