Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

**Eulerian-Lagrangian Simulations of Bubbly Flows in A Vertical Square Duct**[1] RUI LIU, SURYA P. VANKA, BRIAN G. THOMAS, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign
— We report results of Eulerian-Lagrangian simulations of developing upward and downward bubbly flows in a vertical square duct with a bulk Reynolds number of 5000. The continuous fluid is simulated with DNS, solving the Navier-Stokes equations by a second-order accurate finite volume fractional step method. Bubbles of sizes comparable to the Kolmogorov scale are injected at the duct entrance with a mean bulk volume fraction below $10^{-2}$. A two-way coupling approach is adopted for the interaction between the continuous fluid phase and dispersed bubble phase. The bubbles are tracked by a Lagrangian method including drag and lift forces due to buoyancy and Saffman lift. A in-house code, CU-FLOW, implemented on Graphic Processing Unit (GPU) is used for simulations in this work. The preferential distributions of bubbles and their impact on local turbulence structures and their effects on turbulent kinetic energy budgets are studied. Results between an upward flow and a downward flow with the bubbles are compared.

[1]Work Supported by Continuous Casting Consortium at UIUC.

Surya Vanka
Department of Mechanical Science and Engineering,
University of Illinois at Urbana-Champaign

Date submitted: 02 Aug 2013 Electronic form version 1.4