Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

DNS of the Velocity and Temperature Fields in a Model of a Small Room[1] JOHN MCLAUGHLIN, XINLI JIA, GOODARZ AHMADI, Clarkson University, JOS DERKSEN, University of Alberta — This talk presents the results of a numerical study of the velocity and temperature fields in a model of a small room containing a seated mannequin. Results are also presented for the trajectories and ultimate fate of small particles that are introduced through the air inlet as well as particles that are entrained by the mannequin's thermal plume. The study was motivated by an experimental study performed at Syracuse University. In the experimental study, air entered the room through a floor vent and exited through a ceiling vent on the other side of the room. A mannequin was seated facing the floor vent. The mannequin could be electrically heated so that its surface temperature was 31C. The objective of the simulations was to obtain a more detailed understanding of the flow in the room. Of specific interest were the effects of the mannequin on the ultimate fates of small particles. The importance of the thermal plume around the mannequin was of particular interest since the thermal plume plays a role in transporting particles from near the floor to the breathing zone. The simulations were performed with a single phase version of a lattice Boltzmann method (LBM) that was originally developed for two-phase flows by Inamuro et al.

[1]Syracuse Center of Excellence

John McLaughlin
Clarkson University

Date submitted: 18 Dec 2009 Electronic form version 1.4