Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Computational and Experimental Studies of Fluidized Beds for Biomass Gasification[1] FRANCINE BATTAGLIA, Virginia Tech, MIRKA DEZA, NATHAN FRANKA, THEODORE HEINDEL, Iowa State University — Fluidized bed gasifiers can convert feedstocks with low-carbon content into valuable products such as ethanol. Understanding fluidized bed hydrodynamics is important for reactor design and avoiding issues such as agglomeration or defluidization of the bed. In particular, biomass gasification is not well characterized and is the focus of this work. Glass beads or sand particles are typically used as bed materials due to their high sphericity and uniform properties. X-ray imaging will be used to visualize these complex flows and alternative bed materials will be considered to increase X-ray penetration and resolution to enhance flow visualization. Furthermore, computational modeling of fluidized beds can be used to predict operation of biomass gasifiers after extensive validation with experimental data. The hydrodynamics will be modeled assuming each phase behaves as interpenetrating continua using an Eulerian model and each solid phase is characterized by a particle diameter and density so that segregation and elutriation can be described. The simulations will model the cold-flow fluidized bed experiment, and consider factors such as sphericity of the particles, and calibration of drag coefficients. Hydrodynamic results from the simulations will be qualitatively and quantitatively compared to X-ray flow visualization studies of a similar bed.

[1]Grow Iowa Values Fund

Francine Battaglia
Virginia Tech

Date submitted: 04 Aug 2007 Electronic form version 1.4