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Predicting Biomass Fluidization through Appropriate Modeling of Initial Conditions FRANCINE BATTAGLIA, JONAS ENGLAND, SANTHIP KANHOLY, MIRKA DEZA, Virginia Polytechnic Institute and State University — Fluidized bed gasifiers can be used to convert feedstock with low-carbon content into fuels, basic chemicals and hydrogen. When biomass is the feedstock, there is a difference in the fluidization behavior between the solid particles and bed media (e.g., refractory sand) due to contrasting size, shape and particle density. The differences can lead to poor solid fuel distribution and diminished gasifier performance. The present work will focus on computational simulations of a fluidized bed gasifier using an Eulerian-Eulerian model to represent the gas and solid phases as interpenetrating continua. Recent studies to predict biomass fluidization motivated this study to reassess how to best model gas-solid characteristics that capture the same physics measured experimentally. Relations for pressure drop are used to correct for the bed mass by either adjusting the initial solids packing fraction or initial bed height, two parameters that must be specified in CFD models. It was found that adjusting the initial solids volume packing correctly predicted the pressure drop measured experimentally but underpredicted the minimum fluidization velocity. By adjusting the initial bed height to correct for the mass, both the pressure drop and minimum fluidization velocity were successfully predicted without artificially altering the physics and retaining the known characteristics of the bed material.

Francine Battaglia
Virginia Polytechnic Institute and State University

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