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Numerical Simulations of a Biomass Fluidizing Bed with Side Port Air Injection FRANCINE BATTAGLIA, MIRKA DEZA, Virginia Tech, THEODORE J. HEINDEL, Iowa State University — Fluidized beds can be used to gasify biomass in the production of producer gas, a flammable gas that can replace natural gas in process heating. As part of the reactor design, side air ports strategically placed along the reactor column can help promote and improve mixing. Modeling these reactors using computational fluid dynamics is advantageous when performing parametric studies for design and scale-up. From a computational point of view, two-dimensional simulations are easier to perform than three-dimensional simulations, but they may not capture the proper physics. Comparisons of two- and three-dimensional simulations in a 10.2 cm diameter cold-flow fluidized bed with side air injection are used to determine when two-dimensional simulations are adequate to capture the bed hydrodynamics. The medium used to represent biomass is ground walnut shell, which has been shown to have desirable fluidization characteristics. The simulations will be quantitatively compared with X-ray computed tomography experiments for pressure drop through the bed, particle distribution and bed expansion height.

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