

Axial Solid Holdup Distribution and Solid Circulation Rate in a Dual Fluidized Bed Gasifier

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The dual fluidized bed gasification technology by using solid fuels such as coal and biomass is receiving great attention nowadays because it produces medium heating value synthesis gas without N₂ dilution. In this study, a cold model fluidized bed gasifier was designed and constructed to determine the hydrodynamic properties in a bubbling fluidized bed and in a riser using silica sand (260 μm) as the bed materials and determine the optimum operating conditions for biomass gasification in the dual fluidized bed gasifier system. Flow regimes and the axial solid holdup in the riser were determined as a function of riser gas velocity and solid circulation rate. For recycling solids from the bubbling fluidized bed to a riser, seal-pot as a nonmechanical valve was designed. The solid circulation rate can be controlled by aeration rate on the seal-pot, the amount of solids inventory and the riser gas velocity. A correlation was proposed to predict the solid circulation rate as a function of solids inventory and the riser gas velocity.