

Correlation to Predict the Effect of Particle Type on Axial Voidage Profile in Circulating Fluidized Beds

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Abstract : Bed voidage behavior among different flow regimes for Geldart A, B, and D particles (fluid catalytic cracking catalyst (FCC), particle A and glass beads) of diameter range 57-872 μm , apparent density 1470-3092 kg/m^3 , and bulk density range 890-1773 kg/m^3 were investigated in a gas-solid circulating fluidized bed of 0.1 m-i.d. and 2.56 m-height of plexi-glass. Effects of variables (gas velocity, particle properties, and static bed height) were analyzed on bed voidage. The axial voidage profile showed a typical trend along the riser: a dense bed at the lower part followed by a transition in the splash zone and a lean phase in the freeboard. Bed expansion and dense bed voidage increased with an increase of gas velocity as usual. From experimental results, a generalized model relationship based on inverse fluidization number for dense bed voidage from bubbling to fast fluidization regimes was presented.

Keywords : axial voidage, circulating fluidized bed, splash zone, static bed

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