

Experimental Studies and CFD Predictions on Hydrodynamics of Gas-Solid Flow in an ICFB with a Draft Tube

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Abstract : Hydrodynamic study of gas and solid flow in an internally circulating fluidized bed with draft tube is made in this paper using high speed camera and pressure probes for the laboratory ICFB test rig 3.0 m X 2.7 m column having a draft tube located in the center of ICFB. Experiments were conducted using different sized sand particles with varying particle size distribution. At each experimental run the standard pressure-flow curves for both draft tube and annular region beds measured and the same time downward particles velocity in the annular bed region were also measured. The effect of superficial gas velocity, static bed height (40, 50 & 60 cm) and the draft tube gap height (10.5 & 14.5 cm) on pressure drop profiles, solid circulation pattern, and gas bypassing dynamics for the ICFB investigated extensively. The mechanism of governing solid recirculation and the pressure losses in an ICFB has been eluded based on gas and solid dynamics obtained from the experimental data. 3D ICFB CFD simulation runs conducted and extracted data validated with ICFB experimental data.

Keywords : icfb, cfd, pressure drop, solids recirculation, bed height, draft tube

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