

Effect of static mixer on hydrodynamic and gas mixing characteristics in a circulating fluidized bed

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The gas-solids two-phase flow structure in a riser is non-uniform, with a high solids concentration flowing downwards near the wall region and most of the gas passing through the core region. As a result, the gas-solids contact is poor in the riser of circulating fluidized bed (CFB) reactor. Therefore, it is necessary to improve the gas-solids contact and to obtain uniform solids concentration along the riser by introducing internals. In this study, the effect of static mixer internal on the pressure drop and solid holdup in the riser is determined with variations of gas velocity and solid circulation rate. Also, the effect of static mixer on the axial gas dispersion coefficient is determined by using helium as a tracer gas. The riser of CFB was 0.03 m in diameter and 7.2 m in height. FCC catalyst was used as a bed material with a mean diameter of 71 μm and a density of 1969 kg/m^3 . When the static mixer is introduced in a riser, the total pressure drop is higher than that without static mixer and the solids acceleration length at the bottom of the riser is reduced. The axial gas dispersion coefficient is reduced compared to that without static mixer in a riser that indicating the increase of the radial gas-solids mixing.