# Hydrodynamic characteristics in an annular circulating fluidized bed reactor for chemical-looping combustion system

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Chemical-looping combustion (CLC) has the advantages of no energy lost for $CO_2$ separation and no $NO_x$ formation. A laboratory scale circulating fluidized bed (CFB) reactor with double loops of inner and annular zones was designed for application to the CLC system to optimize heat transfer between the oxidation and reduction reactors based on the obtained reactivity data. Static pressures at different heights in the reactor are shown in the pressure balance diagram. The difference in the static head governs driving force for solids circulation in this loop. The solid circulation rate can be controlled by proper adjustment of aeration rate in the loop-seal. The solid circulation rate increases with increasing aeration gas velocity (0.8 $u_{mf}$ - 1.2 $u_{mf}$) in the loop-seal. In proportion to the variation of solid circulation rate, solid holdup in the riser should be under 0.01 to maintain fast fluidization condition for smooth solid circulation. In this CFB reactor, the solid holdup is under 0.0005 in the risers of the both reaction systems.