3D Numerical simulation of gas-particle hydrodynamic behavior in a circulating fluidized bed riser

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Wide applications of fluidized beds in different industrial processes such as coal combustion, biomass gasification, drying systems, granulation, catalysis and coating in the past decades, have increased the need of well understanding of fluid-particle hydrodynamic behavior for designing and optimizing these systems. In this regard, numerical simulation is a strong tool to determine different aspects of fluid-particle interaction. Great amounts of numerical simulation have been done in this field, however; most of them employed 2D simulation which cannot illustrate all features of the flow or in case of 3D simulation pilot scale risers have been analyzed. In this study the effect of wing wall tubes and division walls on gas-particle hydrodynamic behavior in an industrial scale furnace of a circulating fluidized bed for different aeration conditions and particle sizes is discussed numerically, using 3D-Eulerian-Lagrangian Dense Discrete Phase Method (DDPM). Pressure profile and solids volume fraction profiles between wings and division walls will be presented.