

A novel measurement method for the mixing of binary mixtures in three-dimensional fluidized beds

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Abstract

A novel measurement system for mixing property of binary mixtures in three-dimensional fluidized beds is developed based on capacitance probe method. The mixing processes at multi-positions of the bed are acquired simultaneously. A new dispersion coefficient is proposed to characterize the local dispersion of particles and a new mixing index is proposed to evaluate the local mixing quality in three-dimensional fluidized beds. The effect of convection and diffusion mechanism on particle mixing is discussed separately. Results show that the governing mechanism of particle mixing at the center and top of the beds is convection; meanwhile the governing mechanism for particle mixing at the bottom and near the wall is diffusion. The radial dispersion coefficient at the half-radius of the bed is mainly between 0.0038 and 0.026 m²/s, which is about 1.5 times that near the wall. The vertical dispersion coefficient is about 2.5 times that the radial dispersion coefficient.

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