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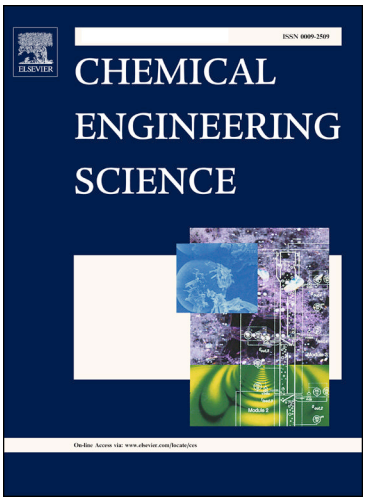

Simulations of dense agitated solid-liquid suspensions – effects of the distribution of particle sizes

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Simulations of dense agitated solid-liquid suspensions – effects of the distribution of particle sizes

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Abstract

We perform Eulerian-Lagrangian simulations of solid-liquid flow in a mixing tank. The simulations are three-dimensional and time dependent and in the transitional flow regime. The lattice-Boltzmann method is used to solve the volume-averaged Navier-Stokes equations. The overall solids volume fraction is of the order of 10%. Situations with the solids only partly suspended are compared to those with fully suspended solids. The emphasis is on the effect of the particle size distribution (PSD) on the suspension behavior. Four PSD's all having the same d_{32} were investigated. It is harder to fully suspend particles with wider size distribution as compared to narrow distributions.

Keywords

Solid-liquid suspension, lattice-Boltzmann method, discrete particle method, particle size distribution, two-way coupling, agitated suspensions

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