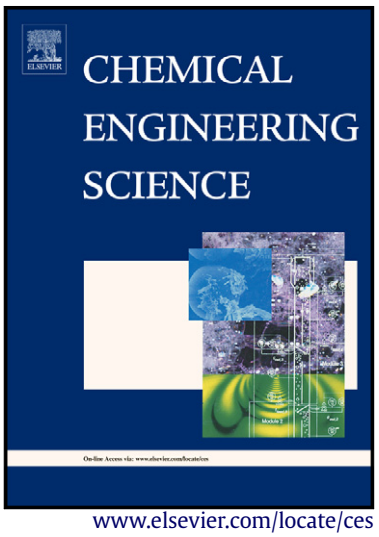

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CFD study of mixing and segregation in CFB risers: Extension of EMMS drag model to binary gas-solid flow

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Abstract: The Energy Minimization Multi-Scale (EMMS) drag model, using Sauter mean particle diameter to represent real particle size distribution, has proven to be effective in improving the accuracy of continuum modeling of gas-solid flow. Nevertheless, mixing and segregation characteristics in circulating fluidized bed (CFB) risers are very important in many situations, which necessitates the explicit consideration of the effects of particle size distribution on the bed hydrodynamics. To this end, an attempt is made to extend the EMMS drag model to bidisperse gas-solid system, where four input parameters that can be obtained from computational fluid dynamics (CFD) simulation, including two slip velocities between gas and each particle phase and two particle concentrations of each phase, are used to solve the proposed EMMS drag model. Heterogeneous indexes, which are used to modify the drag correlation obtained from homogeneous fluidization, are then predicted and fed into multifluid model (MFM) to predict the dynamical behavior of mixing and segregation of bidisperse gas-solid flow in a CFB riser. The effects of different drag force models, kinetic