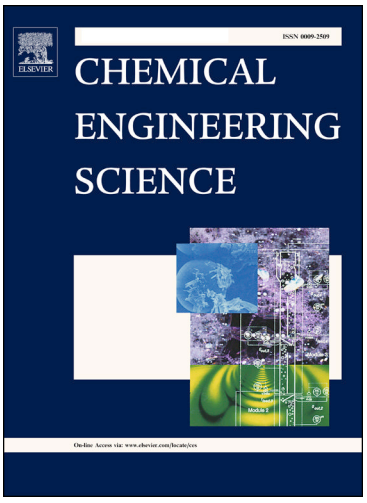

Non-spherical particles in a pseudo-2D fluidised bed: Modelling study

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Non-spherical particles in a pseudo-2D fluidised bed: Modelling study

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Abstract

Fluidised beds are used in a variety of processes because of their favourable mass and heat transfer characteristics. In this and many other processes, non-spherical particles are commonplace, which can drastically affect the fluidisation behaviour. In this study, we use numerical models to study non-spherical fluidisation behaviour in detail. A crucial step in the development of the numerical model is a detailed validation with experimental data. The validated model can then be used with confidence for further investigations. In this study, the results obtained from CFD-DEM modelling are compared with detailed experiments [1]. The particles used are of spherocylindrical shape with an aspect ratio 4. We discuss the numerical modelling strategy including the DEM contact detection algorithm and accurate voidage calculation algorithm. The non-spherical single particle drag model of Hölzer and Sommerfeld [2] is compared with a DNS drag model for spherocylindrical particles developed in-house. We propose two new voidage correction models and compare results with the Di Felice [3] model. The pressure drop, bed height, particle orientation, particle circulation, stacking of particles and coordination number obtained from simulations are compared with experiments. The numerical measurements show good agreement with experiments. Similar to experiments, simulations show

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