CFD PREDICTIONS OF SOLIDS DISTRIBUTION IN STIRRED VESSEL

This paper presents a CFD model for predicting solid particle distribution in a stirred tank. The tank is operated at the ?just suspended? condition, which is difficult to model due to the high variation of solid concentration
within the vessel. The concentration of solid particles is high near the base of the vessel and low at the top near the free surface. The ability to predict the ?just suspended?condition is very important in industrial applications as it determines the lowest power input necessary to suspend the solid particles.In this work the Eulerian Multiphase Model implemented in STAR-CCM+ is used to simulate suspension of glass particles in a stirred vessel. The turbulent flow is modelled
using the standard k?? model. The drag force acting on the particles is modelled using the Gidaspow formula. Two modelling techniques: Multiple Reference Frame (MRF) and Rigid Body Motion (RBM) also known as the sliding
grid method are used for the impeller rotation. RBM correctly resolves the impeller-baffle interactions and gives a better prediction of the flow field but is more computationally expensive in comparison to the MRF method. CFD predictions of the local solid concentrations and velocities are compared against the experimental data of Guida et al. (2009) for a single PBT impeller. Two solids concentrations of 5.2% wt and 10.6% wt and two impeller pumping modes are considered. The comparisons are made in terms of accuracy and computational time.

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