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Coarse grid simulation of dense fluidized bed: a dynamic subgrid drag model JEAN-FRANCOIS PARMENTIER, OLIVIER SIMONIN, Institut National Polytechnique de Toulouse, OLIVIER DELSART, TOTAL CReG —
Unresolved structures in 3D unsteady simulation of gas-particle fluidized bed using the two-fluid model approach can have a drastic influence on the flow dynamic. In particular, dense fluidized bed expansion may be widely overestimated. Such an effect can be inputed to the coarse modeling of the resolved drag term in the momentum equations. Filtered two-fluid model formalism highlights the need to account for a drift velocity due to the subgrid correlation between the fluid velocity and particle concentration fields. A priori analysis were performed from highly resolved simulations of dense fluidized beds. Results gathered provide us constitutive relationship to close this drift velocity and we proposed a dynamic model to predict the filtered drag force. This model was a-posteriori tested on "coarse-grid" fluidized bed simulations. Simulation results compared fairly well to fully resolved simulations and experimental bed expansions.

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