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Influence of the Coarse-Graining Method on a DEM-CFD Simulation of a Pilot-Scale Gas Fluidized Bed

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Abstract : The DEM (Discrete Element Method) is used a lot in the industry to simulate large-scale flows of particles; for instance, in a fluidized bed, it allows to predict of the trajectory of every particle. One of the main limits of the DEM is the computational time. The CGM (Coarse-Graining Method) has been developed to tackle this issue. The goal is to increase the size of the particle and, by this means, decrease the number of particles. The method leads to a reduction of the collision frequency due to the reduction of the number of particles. Multiple characteristics of the particle movement and the fluid flow - when there is a coupling between DEM and CFD (Computational Fluid Dynamics). The main characteristic that is impacted is the energy dissipation of the system, to regain the dissipation, an ADM (Additional Dissipative Mechanism) can be added to the model. The objective of this current work is to observe the influence of the choice of the ADM and the factor of coarse-graining on the numerical results. These results will be compared with experimental results of a fluidized bed and with a numerical model of the same fluidized bed without using the CGM. The numerical model is one of a 3D cylindrical fluidized bed with 9.6M Geldart B-type particles in a bubbling regime.

Keywords : additive dissipative mechanism, coarse-graining, discrete element method, fluidized bed
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