3D Numerical simulation of gas-particle hydrodynamic behavior in a circulating fluidized bed using DDPM

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Numerical simulation is a strong tool to determine different aspects of fluidized bed phenomena. Various methods have been developed for modeling gas-particle interaction numerically in dense beds. Among them most of the models use Eulerian-Eulerian approaches in which solid and fluid phases are treated in the same way and granular properties are added only by solving an additional equation called granular temperature. However by employing Eulerian-Lagrangian methods it is possible to follow each particle in the domain and calculate all the forces applied on it to find it's new position and velocity which is closer to real situation than Eulerian- Eulerian approaches. One of the best Eulerian-Lagrangian methods for modeling dense beds is Dense Discrete Phase Method (DDPM). In this study gas-particle hydrodynamic behavior in the whole cycle of an industrial scale circulating fluidized bed is investigated numerically, using 3D-Unsteady-DDPM. Pressure profile and solid volume fraction profiles in whole cycle for 60 seconds simulation will be presented and discussed.