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DEM and Coarse-grained modeling of bubble and particle behavior in fluidized beds[1] OSCAR ANTEPARA, ANN ALMGREN, MICHELE ROSSO, ROBERTO PORCU, Lawrence Berkeley National Laboratory, JORDAN MUSSER, National Energy Technology Laboratory, WILLIAM FULLMER, National Energy Technology Laboratory; Leidos Research Support Team, CHRISTOPHER BOYCE, Department of Chemical Engineering, Columbia University — MFiX-Exa is a new code being developed by the National Energy Technology Laboratory and Lawrence Berkeley National Laboratory as part of the U.S. Department of Energy's Exascale Computing Project. MFiX-Exa originated by combining discrete element method (DEM) modules of the classic MFiX code (https://mfix.netl.doe.gov) with a low Mach number projection method for the continuous fluid phase. The new algorithm is implemented using the AMReX software for massively parallel block-structured applications (https://amrex-codes.github.io). In this work, we present the coarse-grained(CG) DEM technique in which several particles are lumped into a single Lagrangian parcel. The work focuses on comparisons, in terms of computational time and accuracy, between the traditional (single particle) DEM and the CG-DEM. The problem of interest is a cylindrical gas-solid fluidized bed containing several million 1 mm particles. Comparisons are also made to the experimental data which include bubble characteristics, bed height, and particle velocity distributions. The results assess how accurately the models can reproduce the main characteristics of the gas-solid fluidized bed and the reduction of computational time between the models.

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