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A Study of the Influence of Numerical Diffusion on Gas-Solid Flow Predictions in Fluidized Beds RONAK GHANDRIZ, REZA SHEIKHI, Northeastern University — In this work, an investigation is made of the influence of numerical diffusion on the accuracy of gas-solid flow predictions in fluidized beds. This is an important issue particularly in bubbling fluidized beds since numerical error greatly affects the dynamics of bubbles and their associated mixing process. A bed of coal (classified as Geldart A) is considered which becomes fluidized as the velocity of nitrogen stream into the reactor is gradually increased. The fluidization process is simulated using various numerical schemes as well as grid resolutions. Simulations involve Eulerian-Eulerian two-phase flow modeling approach and results are compared with experimental data. It is shown that higher order schemes equipped with flux limiter give favorable prediction of bubble and particle dynamics and hence, the mixing process within the reactor. The excessive numerical diffusion associated with lower order schemes results in unrealistic prediction of bubble shapes and bed height. Comparison is also made of computational efficiency of various schemes. It is shown that the Monotonized Central scheme with down wind factor results in the shortest simulation time because of its efficient parallelization on distributed memory platforms.

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