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A multilevel simulation approach to derive the slip boundary condition of the solid phase in two-fluid models[1] ZHI-GANG FENG, University of Texas at San Antonio, EFSTATHIOS MICHAELIDES, SHAOLIN MAO, Los Alamos National Laboratory — The simulation of particulate flows for industrial applications often requires the use of a two-fluid model (TFM), where the solid particles are considered as a separate continuous phase. One of the underlining uncertainties in the use of aTFM in multiphase computations comes from the boundary condition of the solid phase. The no-slip condition at a solid boundary is not a valid assumption for the solid phase. Instead, several researchers advocate a slip condition as a more appropriate boundary condition. However, the question on the selection of an exact slip length or a slip velocity coefficient is still unanswered. In the present work we propose a multilevel simulation approach to compute the slip length that is applicable to a TFM. We investigate the motion of a number of particles near a vertical solid wall, while the particles are in fluidization using a direct numerical simulation (DNS); the positions and velocities of the particles are being tracked and analyzed at each time step. It is found that the time- and vertical-space averaged values of the particle velocities converge, yielding velocity profiles that can be used to deduce the particle slip length close to a solid wall.

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