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Direct numerical simulation of flow including dense solid particles having microscopic arrangements TOMOYA WAKAMATSU, TAKUYA TSUJI, HIROTAKA YADA, TOSHITSUGU TANAKA — In the flows including dense solid particles such as gas-fluidized beds, particles take complex arrangements as a result of interactions with surrounding particles, walls and gas flows. This kind of structure formation gives large influence on the overall flow behavior. Due to the existence of dense particles, it is still difficult to investigate the microscopic flows occurring in the narrow gaps in-between particles accurately and it has not been discussed well up to the present. In the present study, a direct numerical simulation by coupling discrete element method (DEM) and immersed boundary method (IBM) is performed. This is the first step of our continuing study and the drag force working on particles and permeability of flows are investigated in fixed bed conditions. In addition to the particle arrangement, the solid volume fraction and Reynolds number are varied and its influence is discussed. The results of a two-dimensional gas-fluidized bed are also presented in the study.

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