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Numerical simulation of an apparent viscosity of slurry by the DEM-DNS method

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Numerical simulation of an apparent viscosity of slurry is required in industries. The effects of aggregation and sedimentation of colloidal particle on the apparent viscosity were well studied for transport system of slurry. However, it is hard to measure the apparent viscosity because of the complex interaction between fluid and particles. In this study, we develop a new method which can evaluate the apparent viscosity by coupling Direct Numerical Simulation (DNS) and Discrete Element Method (DEM). Various numerical simulation of slurry which have dispersed and sedimentation structures were carried out. We verify the adequacy of the method by comparing the simulation's results with experiment's ones, where effects of diameter and density of particle on the apparent viscosity were investigated.

Keywords: Slurry, Viscocity, Direct Numerical Simulation, Discrete Element Method, Immersed Boundary Method