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► **To cite this version:**

Lhassan Amarsid, Farhang Radjai, Jean-Yves Delenne, Frédéric Perales, Yann Monerie. Simulation of dense granular suspensions. Matériaux 2014, Nov 2014, Montpellier, France. hal-01594289

HAL Id: hal-01594289

<https://hal.science/hal-01594289>

Submitted on 3 Jun 2020

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CM-07-713

Simulation of dense granular suspensions

07 - Comportements mécaniques

#CM-07-713

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We analyze the shear flow of dense granular materials composed of circular particles and immersed in a viscous fluid by means of molecular dynamics simulations interfaced with the Lattice Boltzmann Method. A homogeneous flow of the suspension is obtained through periodic boundary conditions and by directly applying a confining pressure on the granular phase and shearing the fluid phase. The steady-state rheology may be described in terms of effective friction coefficient and packing fraction of the suspension as a function of the ratio of viscous shear stress to confining pressure (frictional description), on one hand, and in terms of normal and shear viscosities of the suspension as a function of the packing fraction (viscous description), on the other hand. We show that the simulation data are consistent with both descriptions and in close agreement with the corresponding scaling laws observed in recent experiments. This dual description implies that the friction coefficient is a function only of the packing fraction. Indeed, we find that all our friction data versus packing fraction for different values of fluid viscosity collapse on the same curve.