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Simulations of shear-thinning frictional non-Brownian suspensions. ELISABETH LEMAIRE, LAURENT LOBRY, FREDERIC BLANC, FRANCOIS PETERS, UMR7010 CNRS UCA Institut de Physique de Nice, RSC TEAM — Most non-Brownian suspensions exhibit non-Newtonian behaviours such as anisotropic normal stresses, shear-thickening or shear-thinning. The later is still largely an open question. Acrivos et al. (JoR 1994) proposed that particle re-suspension is responsible for the apparent shear-thinning behavior in a cylindrical Couette rheometer. Another explanation has been suggested by Vasquez-Quesada et al. (PRL 2017), who noticed that some polymeric suspending liquids themselves are shear-thinning for the high shear-rate values involved in the narrow gaps between particles. Here we propose that the shear-thinning behaviour is directly connected to the solid contact between particles that has been shown to play a crucial role in the rheological behaviour of concentrated non-Brownian suspensions. In particular, it has been recently shown that frictional contact between particles greatly enhances the viscosity. Even though the friction coefficient between macroscopic surfaces does not depend on the load, it may be not the case at the scale of the low load contact between particles in suspensions. Here, we present discrete numerical simulations where the friction coefficient decreases with the interparticle forces. The obtained shear-thinning behaviour is in good agreement with our experiments.

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