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On the effects of long-range hydrodynamic interactions in dense suspensions STANY GALLIER, ArianeGroup, LAURENT LOBRY, FRANCOIS PETERS, Institut de Physique de Nice — This work intends to evaluate the role of many-body long-range hydrodynamic interactions (LRHI) on dense suspensions. Three-dimensional simulations of sheared suspensions are conducted with and without LRHI for volume fractions between 0.1 and 0.62 (frictionless) and 0.1 and 0.54 (frictional). Discarding LRHI leads to an overestimation of viscosity by a factor of 1.5-2 for intermediate volume fractions. However, near jamming, viscosities are much closer and diverge with similar scaling laws; the critical fraction is found to be about 0.65 (frictionless) and 0.58 (frictional). LRHI are found to have a marked impact on diffusion coefficients. Particle velocities are correlated on a much longer range when LRHI are included, meaning that long-range hydrodynamics may not be significantly screened by crowding. Assuming only short-range lubrication interactions is therefore suitable only for qualitative simulations of rheology near jamming but becomes questionable for more dilute suspensions.

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