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Velocity Fluctuations in Non-Brownian Suspensions Undergoing Simple Shear Flows

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The velocity fluctuations present in macroscopically homogeneous suspensions of neutrally buoyant, non-Brownian spheres undergoing simple shear flow, and their dependence on the microstructure developed by the suspensions, are investigated in the limit of vanishingly small Reynolds numbers using Stokesian dynamics simulations. We show that, in the dilute limit, the standard deviation of the velocity fluctuations (the so-called suspension temperature) is proportional to the volume fraction, in both the transverse and the flow directions, and that a theoretical prediction, which considers only the hydrodynamic interactions between isolated pairs of spheres, is in good agreement with the numerical results even up to volume fractions of the order of 10%.

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