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Shear-induced dispersion in a dilute suspension of charged spheres PIJUSH PATRA, ABHISEK KUNDU, ANUBHAB ROY, Indian Institute of Technology Madras — Shear-induced dispersion have been observed in suspensions in a Newtonian fluid even when thermal effects are negligible (for instance, see Leighton & Acrivos 1987a,b; Eckstein, Bailey & Shapiro 1977). This random walk of a particle due to hydrodynamic interactions with its neighbours in a sheared non-Brownian suspension can be characterized by a diffusivity. It is well known that in the absence of non-hydrodynamic effects, inertialess pairwise interactions being foreaft symmetric, diffusive behaviour arises from three-particle interactions. However, for cases where pairwise interactions are asymmetric due to surface roughness (see Da Cunha & Hinch 1996), particle inertia (see Subramanian & Brady 2006), or short-ranged repulsive forces, the diffusivities can be obtained by averaging the transverse displacements for successive uncorrelated pairwise interactions weighted by their frequency of occurrence. In this study, we consider a repulsive electrostatic force using the GouyChapman model for the electrical double layer. We determine the transverse components of the shear-induced self-diffusivity as a function of the inverse Debye length and relative strength of electrostatic to shear forces.

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