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Sedimentation of Dilute Suspensions

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In the theory of sedimentation of dilute disordered suspensions the calculation of the mean speed of sedimentation and of the variance of the speed is problematic. For a random distribution of particles the variance of the speed diverges with the number of particles. Therefore one must take account of the ordering of particles caused by sedimentation. We show that for a class of sedimentation states, corresponding to definite values of the mean sedimentation velocity and of the horizontal and vertical velocity variance, the static structure factor and the velocity correlation functions of the suspended particles exhibit screening. The mean velocity and the variances, as well as the density and velocity distribution functions, are calculated in continuum approximation for given parameters characterizing the distribution in configuration space, and compared with experiment.

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