

Abstract Submitted
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X-ray photon correlation spectroscopy in a shear flow ANDREI FLUERASU, European Synchrotron Radiation Facility — X-ray photon correlation spectroscopy was used to measure the diffusive dynamics of colloidal suspensions in a shear flow. The results presented here show how the intensity autocorrelation functions measure a coupling between the diffusive dynamics of the particles and their flow-induced, convective motion. However, in the limit of low flow/shear rates, it is possible to obtain the diffusive component of the dynamics. The conditions under which this is possible are easier to achieve at higher values of the scattering wavevector q and this may provide an advantage of X-ray over, for e.g. light, photon correlation spectroscopy. In recent work (A. Fluerasu et al., submitted, 2007) we have shown this result to hold for dilute (particle volume fraction $\Phi \approx 10\%$) suspensions when the correlation functions probe, basically, the self-diffusion of individual, non-interacting particles. Here we will also address the collective motion of concentrated suspensions of hard-sphere systems (Φ up to 50 %) and study the coupling between the shear-induced response and the collective diffusion of the suspension. An important benefit of this experimental strategy over more traditional X-ray methods, is the minimization of X-ray induced beam damage, which makes the method suitable for the study of the dynamical properties of a large class of complex soft-matter and biological fluids.

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