Abstract Submitted
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Near-wall colloidal dynamics probed by evanescent-wave dynamic light scattering[1] J. BLAWZDZIEWICZ, Yale University, E. WAJNRYB, IPPT, Warsaw, Poland, P. LANG, IFF, Juelich, Germany, Y.-N. YOUNG, NJIT, J.K.G. DHONT, IFF, Juelich, Germany, B. CICHOCKI, Warsaw University, Poland — We present theoretical, numerical, and experimental investigations of evanescent-wave dynamic light scattering (EWDLS) in a wall-bounded colloidal suspension of spheres. The first cummulant Γ_1 representing the initial decay of the time autocorrelation function of the scattered field is expressed in terms of the hydrodynamic tensor $\mathbf{H_w}(\kappa, \mathbf{q})$ describing response of the suspension to a spatially varying harmonic force damped exponentially away from the wall. The wavelength of the harmonic spatial variation corresponds to the scattering vector $\mathbf{q}$ in the EWDLS experiments, and the exponential decay is characterized by the decay length κ^{-1} of the evanescent wave. The hydrodynamic tensor $\mathbf{H_w}$ is evaluated using viral expansion at low densities and numerical simulations at higher densities. A complex non-isotropic structure of the tensor $\mathbf{H_w}(\kappa, \mathbf{q})$ reflects the hydrodynamic particle-wall coupling and wall-induced short range suspension ordering. Our theory and simulations agree well with the results of EWDLS experiments.

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