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Near Wall Dynamics in Colloidal Suspensions Studied by Evanescent Wave Dynamic Light Scattering¹

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The dynamics of dispersed colloidal particles is slowed down, and becomes anisotropic in the ultimate vicinity of a flat wall due to the wall drag effect. Although theoretically predicted in the early 20th century, experimental verification of this effect for Brownian particles became possible only in the late 80s. Since then a variety of experimental investigations on near wall Brownian dynamics by evanescent wave dynamic light scattering (EWDLS) has been published. In this contribution the method of EWDLS will be briefly introduced, experiments at low and high colloid concentration for hard-sphere suspensions, and the theoretical prediction for measured initial slopes of correlation functions will be discussed. On increasing the particle concentration the influence of the wall drag effect is found to diminishes gradually, until it becomes negligible at volume fractions above $\phi > 0.35$. The effect that a wall exerts on the orientational dynamics was investigated for different kinds of colloids. Experiments, simulations and a virial expansion theory show that rotational dynamics is slowed down as well. However, the effect is prominent in EWDLS only if the particles' short axis is of the order of the evanescent wave penetration depth.

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