Influence of structure in heterodyne electrophoretic light scattering experiments of concentrated colloidal suspensions

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In a Laser Doppler Velocimetry setup a heterodyne light scattering technique (mixing scattered light with a reference beam) is used to measure the electrophoretic flow behavior of a concentrated, deionized colloidal suspension. It was found that the measured power spectra show an increase of the frequency-integrated intensity $A$ with the electric field $E$. Because the number of particles should remain constant this finding is unusual. Although the system is interacting an influence of the structure factor on the spectra, for example a phase dependence of the intensity $A$, is apparently missing. A model that explains the intensity effect and the missing structural influence on the spectra will be discussed in detail.

Increase of frequency integrated intensity $A$ with increasing electric field $E$. Solid curves: Fits to the data using.