

## Theory of Electrorotation of Clustered Colloidal Particles

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**Abstract:** When a colloidal suspension is exposed to a strong rotating electric field, an aggregation of the suspended particles is induced to appear. In such clusters, the separation between the suspended particles is so close that one could not neglect the multiple image effect on the electrorotation (ER) spectrum. Since so far the exact multiple image method exists in two dimensions only, rather than in three dimensions, we investigate the ER spectrum of the clustered colloidal particles in two dimensions, in which many cylindrical particles are randomly distributed in a sheet cluster. We report the dependence of the ER spectrum on the material parameters. It is shown that the multiple image method predicts two characteristic frequencies, at which the rotation speed reaches maximum. To this end, the multiple image method is numerically demonstrated to be in good agreement with the known Maxwell-Garnett approximation.

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