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Electrophoresis of Colloids via Asymmetric Rectified Electric Fields TIMOTHY HUI, JOSHUA LAU, S.M.H. HASHEMI AMREI, GREGORY MILLER, WILLIAM RISTENPART, University of California Davis — Charged particles suspended in a dilute electrolyte solution exhibit complex aggregation and levitation behaviors in response to applied oscillatory fields. In particular, an experimentally observed bifurcation in the particle height over an electrode was recently shown to be qualitatively consistent with a force balance between gravity and an electrophoretic force due to the Asymmetric Rectified Electric Fields (AREF) that occur in electrolytes with unequal mobilities. Here, we elaborate on the dynamics of particle electrophoresis in response to AREFs. Using a combination of optical and confocal fluorescence microscopy, we measure the colloidal particle levitation and aggregation dynamics as a function of the applied field properties and electrolyte composition. We show that the dynamics are broadly consistent with numerical calculations of the AREF driving force, and we discuss the implications for precise control and electrophoretic trapping of particles using oscillatory fields.

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