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Nonlinear electrophoresis of ideally polarizable particles BRUNO FIGLIUZZI, WAI HONG RONALD CHAN, CULLEN R. BUIE, Massachusetts Institute of Technology — We focus in this presentation on the nonlinear electrophoresis of ideally polarizable particles. At high applied voltages, significant ionic exchanges occur between the EDL which surrounders the particle and the bulk solution. In this situation, the velocity field, the electric potential and the ionic concentration at the immediate vicinity of the particle are described by a complicated set of coupled nonlinear partial differential equations. These equations are classically considered in the limit of a weak applied field, which enables further analytical progress (Khair and Squires, Phys. Fluids, 2010). However, in the general case, the equation governing the electrophoretic motion of the particle must be solved numerically. In this study, we rely on a numerical approach to determine the electric potential, ionic concentration and velocity field in the bulk solution surrounding the particle. The numerical simulations use a pseudo-spectral which was used successfully by Chu and Bazant to determine the electric potential and the ionic concentration around an ideally polarizable metallic sphere (Physical Review E, 2006). Our numerical model also incorporates the steric model developed by Kilic *et al.* in 2007 to account for crowding effects in the electric double layer.

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