Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Electrophoresis in bounded doamins EHUD YARIV, Technion — Electrophoretic motion is usually described by a linear model, based upon the smallness of the applied field relative to the equilibrium field in the screening Debye layer surrounding the particle. This model, in turn, leads to the Smoluchowski's slip condition and eventually results in mobility relations. The mobility concept is valid provided the external electric force is neglected — a procedure superficially supported by the net electric neutrality of the combined particle-layer system. In this talk, however, I will show that this force does not vanish in general. Accordingly, a consistent scheme is formulated for analyzing the nonlinear motion of a particle in an applied field. This motion is illustrated in two contexts: rotation of non-spherical particles, and drift of a spherical particle away from a planar wall. I will also describe an analogy to incompressible and inviscid fluid motion. This analogy enables for experimental verification of three-dimensional potential flow solutions.

Ehud Yariv
Technion

Date submitted: 27 Nov 2005 Electronic form version 1.4