Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Electrohydrodynamics of suspension of liquid drops in AC fields
MD. ABDUL HALIM, ASGHAR ESMAEELI, Southern Illinois University Carbondale — Manipulation of liquid drops by an externally applied electric field is currently the focus of increased attention because of its relevance in a broad range of industrial processes. The effect of a uniform DC electric field on a solitary drop is well studied; however, less is know about the impact of electric field on suspension of liquid drops, and very little information is available on the impact of AC field on a single or a suspension of drops. Here we report the results of Direct Numerical Simulations of electrohydrodynamics of suspension of liquid drops. The governing equations are solved using a front tracking/finite difference technique, in conjunction with Taylor's leaky dielectric model. The imposed electric potential comprises of two parts, a time-independent base and a time-dependent part. The goal is to explore the relative importance of these two components in setting the statistically steady state behavior of the suspension. To this end, we report the results of three sets of simulations, where (i) the time-dependent part act as a perturbation on the base potential, (ii) the two components are of the same order, and (iii) the time-dependent part is much larger than the base potential. The problem is studied as a function of the governing nondimensional parameters.

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Date submitted: 03 Aug 2012 Electronic form version 1.4