

Abstract Submitted
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3D experimental investigation of the interplay between dielectrophoresis and induced-charge electroosmosis ALICIA BOYMELGREEN, MATAN ZEHAVI, GILAD YOSSFON, TECHNION — It is well-known that the advent non-linear electrokinetic flows, such as induced-charge electroosmosis, are strongly dependent on the frequency of the applied field. However, to date, there exists no unifying theory which can exactly predict both the strength and frequency dispersion of such electrokinetic flows. Using microPIV and temperature sensitive dyes we demonstrate the presence of a number of competing non-linear effects including dielectrophoresis, electrothermal flow and wall effects which compete with induced-charge electrokinetic flow, potentially causing a distortion of both the strength and frequency dispersion predicted for pure induced-charge effects. In terms of the wall effects, we investigate the differences between channels in which the walls are conducting (the field is perpendicular to the wall) and insulating (the field is parallel to the wall). This work is of both fundamental and practical importance and may be used to further refine non-linear electrokinetic theory and optimize the flow parameters of electroosmotic pumps and the mobility of electrokinetically driven micromotors or carriers in lab-on-a-chip analysis systems.

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