Abstract Submitted
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Fully resolved immersed electrohydrodynamics for target-detection, particle motion, and self propulsion[1] AMNEET P.S. BHALLA, Department of Mechanical Engineering, Northwestern University, BOYCE E. GRIFFITH, Leon H. Charney Division of Cardiology, Department of Medicine, New York University School of Medicine, NEELESH A. PATANKAR, Department of Mechanical Engineering, Northwestern University — Motion of particles, rigid or deforming, through conductive fluid media under the presence of electric fields require the solution of coupled electrodynamics and hydrodynamics equations. In this work we present a numerical method for modeling such coupled equations in an adaptive mesh refinement and immersed body framework. The methodology permits us to locally resolve high electric field gradients and boundary layers near the fluid-structure interfaces at a moderate computational expense. Using such a framework a broad range of problems such as "electrolocation" (a technique used by knifefish to detect its target due to the distortion of self generated electric field by a prey in its vicinity), dielectrophoretic motion of particles in microfluidic channels, development of artificial "electrosense" for underwater vehicles, among others, can be addressed.

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