

Abstract Submitted
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Analysis of chaotic electroconvection near electrodes¹ SCOTT DAVIDSON, ALI MANI, Stanford University — Electroconvective instability has recently been shown computationally to occur near electrode surfaces in induced-charge electro-osmosis (ICEO) in addition to its well-known occurrence near ion-selective membranes under large applied fields. This instability occurs due to the interaction of the extended space charge region of nonequilibrium electrical double layers with the applied field. The presence of the instability causes chaotic flow leading to order one changes to mean flow rates in ICEO as well as leading to flow between parallel electrodes where the fluid would otherwise remain stationary. We present direct numerical simulations (DNS) of the coupled Poisson-Nernst-Planck and Navier-Stokes equations analyzing both flow and transport effects in various regimes of the governing nondimensional parameters.

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