

Abstract Submitted
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Using particle-in-cell simulations to study non-local effects in inductively coupled plasmas AARON FROESE, DIMA SYDORENKO, ANDREI SMOLYAKOV, Dept of Physics and Engineering Physics, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 2E5 — In the low pressure, low frequency regime, electron dynamics in finite temperature inductively coupled plasmas is dominated by thermal motion: the mean free paths are large relative to device size and trajectories are strongly curved by the induced rf magnetic field. This causes problems for the classical, local theory of the anomalous skin effect, which is unable to describe the nonlinear behaviour. We use a particle-in-cell simulation to study the ponderomotive force and surface impedance, while retaining the full complexity of the problem. If the nonlinearities are ignored, the simulated PMF is proportional to the amplitude of the driving electromagnetic wave squared, in agreement with analytic theories. When the magnetic field and longitudinal electric field are included, the exponent becomes dependant on temperature.

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