Analytical modeling of the anomalous skin effect and negative power absorption in low pressure plasmas THOMAS MUSSENBROCK, MARTIN LAPKE, THOMAS EISENBARTH, Ruhr University Bochum, RALF PETER BRINKMANN, Ruhr University — The theory of the anomalous skin effect and related phenomena in a bounded low pressure plasma (below 1 Pa) is discussed. In this particular regime the relation between the high frequency current density and the electric field is nonlocal. To describe the situation, Maxwell's equations have to be coupled self consistently with Boltzmann's equation. In this paper we present an analytical, self-consistent solution to the one-dimensional problem of a plane wave propagating from the left half space into the right half space filled with a bounded homogeneous plasma. Particularly, we discuss phase mixing and negative power absorption, and finally the effect of the finite thermal velocity of electrons on the field distribution and the power deposition.

Thomas Mussenbrock
Ruhr University Bochum

Date submitted: 08 Jun 2009   Electronic form version 1.4