

Abstract Submitted
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Resonances and Electromagnetic Field Structure in CCP HF Discharge with Large Electrodes SERGEY DVININ, Lomonosov Moscow State University — Analytical expressions for CCP HF discharge impedance, taking into account excitation of surface waves [1], propagating along plasma–sheath–metal interface, and evanescent waves are presented. The waves are experimentally found in ICP plasma in vicinity of large RF electrode in [2]. The well-known plasma-sheath geometrical resonance corresponds to excitation of evanescent waves. Surface waves strongly decay at these conditions. When electrons density increases, skin depth falls. The role of evanescent waves in plasma decreases and the length and energy transferred by surface waves grow. At high plasma density discharge impedance is almost completely defined by surface waves. Influence of even and odd surface take into account. Space charge sheath is described by nonlinear phenomenological model. Specified approach allows to calculate discharge impedance and explains possibilities ambiguity of plasma characteristics, connected with electrodynamic resonances and chemical processes in plasma. It is found, that the role of even and odd waves is defined by geometry of discharge and properties of matching device. Analytical results are compared with numerical modeling.

[1] M.A. Lieberman, J.P. Booth, P. Chabert et al. *Plasma Sources Sci. technol.*, 2002, 11, 283.

[2] W. Gekelman, M. Barnes, S. Vincena, P. Pribyl. *Phys. Rev. Lett.* 2009, 103, 045003.

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