

Abstract Submitted
for the GEC09 Meeting of
The American Physical Society

Influence of the Walls on the Formation of a DC Glow Discharge¹

VLADIMIR DEMIDOV, West Virginia University, YEVGENY BOGDANOV, SPbSU, STEVE ADAMS, AFRL, ANATOLY KUDRYAVTSEV, SPbSU — 2D simulations of a DC glow discharge with a cold cathode in argon have been performed for various radii of the discharge tube. It is shown that the loss of the charged particles to the walls can significantly affect plasma parameters as well as properties of the cathode sheath. The longitudinal dimensions of the Negative Glow and Faraday Dark Space depend on the transverse loss of the charge particles and are not consistently predicted with a 1D model. The common assumption that the cathode sheath can be analyzed independently of the plasma also may not be valid. The transverse inhomogeneity of the plasma leads to a change in the current density distribution over the cathode surface. The thickness of the cathode sheath can vary with radial distance from the discharge axis, even for the case of negligible radial loss of the charge particles. The 2D model results provide an analysis of the conditions of applicability of the 1D model.

¹This work was supported by the AFOSR.

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Date submitted: 09 Jul 2009

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