

Abstract Submitted
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Effect of nonlocal fast electrons on plasma properties in short discharges¹ J. BLESSINGTON, WVU, S.F. ADAMS, AFRL, V.I. DEMIDOV, UES, inc., I. KAGANOVICH, PPPL, M.E. KOEPKE, WVU, B.A. TOLSON, ISSI, inc. — It is demonstrated experimentally that fast electrons, produced from the cold cathode in a short discharge without positive column, can charge walls to the negative potentials much higher than those corresponding to electron temperatures in the plasma. Those fast electrons are nonlocal and conserve their energies after many elastic collisions with atoms. This effect is similar to self-trapping of fast electrons in afterglow plasmas [1]. Application of additional potentials to the walls can change conditions of self-trapping of the fast electrons and modify structure of the discharge and plasma properties. The result can be used for controlling plasma properties, particular for changing intensities of spectral lines and lighting efficiency. Similarities and differences of the above effects for short discharges with cold and hot cathodes are discussed. Similar effects are important in cathode region (negative glow) of long discharges with positive column. This work was supported by the AFOSR. [1] V.I. Demidov, C.A. DeJoseph, Jr. and A.A. Kudryavstev, PRL 95, 215002 (2005).

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