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Modeling a short cold cathode DC discharge device with controllable plasma parameters[1] ANATOLY KUDRYAVTSEV, SPbSU, STEVEN ADAMS, AFRL, VLADIMIR DEMIDOV, UES/WVU, YEVGENY BOGDANOV, SPbSU — A short (without positive column) DC gas-discharge device with a cold cathode has been modeled. The device consists of the plane disk-shaped cathode and anode while the inter-electrode gap is bounded by a cylindrical wall. The cathode and anode are each 2.5 cm in diameter, and the inter-electrode gap is 12 mm. The wall is made of conducting parts divided by an insulator. The modeling has been performed for argon plasma at 1 Torr pressure. It is demonstrated in the model that spatial distributions of electron density and temperature and argon metastable atom density depend on the DC voltage applied to different conducting parts of the wall. Applied voltage can trap within the device volume energetic electrons arising from atomic and molecular processes in the plasma. This leads to a modification in the heating of slow electrons by energetic electrons and as a result modifies the controlling plasma parameters.

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