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Spatial profiles of the cathode layer parameters in the strongly constricted and diffuse atmospheric pressure glow discharges. LEANID SIMONCHIK, VALERY ARKHIPENKO, ALIAKSANDRA KAZAK, Institute of physics of NAS of Belarus — In high-current atmospheric pressure glow discharges without limiting walls of discharge chamber, the degree of positive column contraction should be determined by the relation of its diameter to the dimension of negative glow which are defined by transverse electron concentration or light emission profiles. In this report, it is shown experimentally that parameters of the cathode fall in normal atmospheric pressure glow discharge with diffuse positive column more or less fit the scaling laws. Radially limited heat flow from the strongly constricted positive column to the cathode results in inhomogeneous distribution of the reduced electric field along the cathode surface. At that, the reduced electric field decreases radially and the cathode fall parameters mismatch the scaling laws at the center of the cathode fall. It is established that the cathode heating resulting from the discharge current flow leads in such a discharge to the increase in the cathode fall. On the contrary, additional heating of cathode by external heat source decreases the cathode fall. The gas heating at the edge of cathode fall happens mainly due to both the heat transfer from hot cathode and the current flow. Spatial profiles of current flow lines in cathode region are discussed.

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