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Study of short atmospheric pressure dc glow microdischarge in air[1] ANATOLY KUDRYAVTSEV, SPbSU, EUGENE BOGDANOV, SPbSPU, ALEXANDER CHIRTSOV, SERGEY EMELIN, SPbSU — The results of experiments and simulations of short (without positive column) atmospheric pressure dc glow discharge in air are presented. We used metal steel electrodes with a gap of 5-100 microns. The experimental voltage–current characteristic's (VAC) have a constant or slightly increasing form at low gap. The most stable microdischarges were burning with a flat cathode and rounded anode, when the length of the discharge is automatically established near the minimum of the Paschen curve by changing their binding on the anode. In this case microdischarge was stable and it had growing VAC. For simulations we used 2D fluid model with kinetic description of electrons. We solved the balance equations for the vibrationally- and the electronically-excited states of a nitrogen and oxygen molecules; nitrogen and oxygen atoms; ozone molecule; and different nitrogen and oxygen ions with different plasmochemical reactions between them. Simulations predicted the main regions of the dc glow discharges including cathode and anode sheath and plasma of negative glow, Faraday dark space and transition region. Gas heating plays an important role in shaping the discharge profiles.

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