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On the mechanism of hollow-needle to plate atmospheric-pressure DC discharge[1] MILAN SIMEK, Institute of Plasma Physics, Academy of Sciences of the Czech Republic, Za Slovankou 3, 18221 Prague 8, Czech Republic, STANISLAV PEKAREK, Czech Technical University, Faculty of Electrical Engineering, Technick 2, 166 27 Prague 6, Czech Republic — Hollow needle to plate electrical discharge at atmospheric pressure with a supply of gaseous medium through the needle electrode is frequently studied for a variety of ecological applications. We explored various combinations of the mass flow and DC driving voltage in order to find limits of stable discharge operation. In pure nitrogen, we observed only two basic discharge modes. In the case of the needle biased negatively and at low energy dissipated between electrodes, the discharge is restricted to the small area surrounding the needle cathode. It takes the shape of a short continuous luminous jet, which is directed towards anode. At higher dissipated energy, the discharge is more complex. The luminous jet becomes longer and, simultaneously, the gap between the tip of the jet and the anode surface is frequently bridged by very thin filamentary discharges. In the case of the needle biased positively and at low dissipated energy, the discharge resembles a diffuse weekly luminous cone bridging completely the gap. With increasing energy, the continuous cone is superimposed with pulsed luminous filamentary discharges.

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