Spectroscopic investigation of CORONA DISCHARGE under ATMOSPHERIC PRESSURE

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An experimental setup for spectroscopic studies of the corona discharge in air at electrode system "point - to - plane" was created. Preliminary results of spectral composition radiation are described. The identification of spectra is carried out and the rotary temperatures corresponding to the radiating excited states of nitrogen molecule and nitrogen ion molecule are determined. The received results are compared to the experimental results of [1-4].

Active discharge electrode was performed in the form of a needle. The passive electrode had a cylinder form diameter of 70 mm. The interelectrode distance could vary. In this experiment it equal to 16 mm. The voltage from the high voltage transformer through a rectifier diode was applied to the oscillator circuit (capacitor storage). The capacitor was of 500 pF. The storage was directly connected to the electrodes. Adjustment of the high-voltage was carried out by means of auto-transformer. The polarity of the high voltage determined on the high-voltage diode. The applied voltage and current in the discharge circuit were measured using kilovoltmeter and micro-ammeter respectively. Voltage and current signals were also recorded on an oscilloscope.

To register a luminescence of the negative corona an optical spectrometer Ocean Optics HR4000 (200-1100 nm) was used, as well as electro-optical converter and a digital photo camera. The corona image by means of a quartz lens gathered in the plane of an entrance aperture of an optical fiber of the spectrometer.

Visually, the geometry and behavior of a negative corona in an active electrode coincide with those obtained in [5]. In was found that the emission spectrum of a negative corona lies in the range of 300 - 450 nm. It is represented mainly by electronic-vibrational bands of the second positive system of nitrogen molecule and the first negative system of nitrogen ion molecule. The values of the rotational temperatures corresponding to the emitting excited states of nitrogen molecule and nitrogen ion molecule are different [6,7].

References

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