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ELECTRIC ARC IN PLASMA FLOW OF GAS DISCHARGE WITH A LIQUID ELECTROLYTE CATHODE

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A distinctive feature of gas discharge with liquid electrolyte cathode is multi-channel nature in region of binding to electrolyte. As the current increases, discharge channels become larger. In the ranges of currents of amperes and tens of amperes, they are clearly recorded in high-speed video frames [1, 2]. Under certain conditions, a contracted channel is formed in discharge gap [3, 4]. At the same time, the general multichannel is preserved. The contracted channel appears and disappears randomly. In this work, the possibility of formation of contracted channel in controlled mode is investigated.

The gas discharge was ignited between the metal anode *1* and the liquid electrolyte *2*, which flowed out from the vessel *3* in the form of a glass (Fig. 1). A graphite plate *4* was located inside the vessel for supplying a negative potential from a power source. The electric arc was ignited between the metal anode *1* and the cathode *5*. The current was regulated by a step change in ballast resistors *6* and *7*. The power source was a three-phase full-wave rectifier with an output voltage of 1200 V.

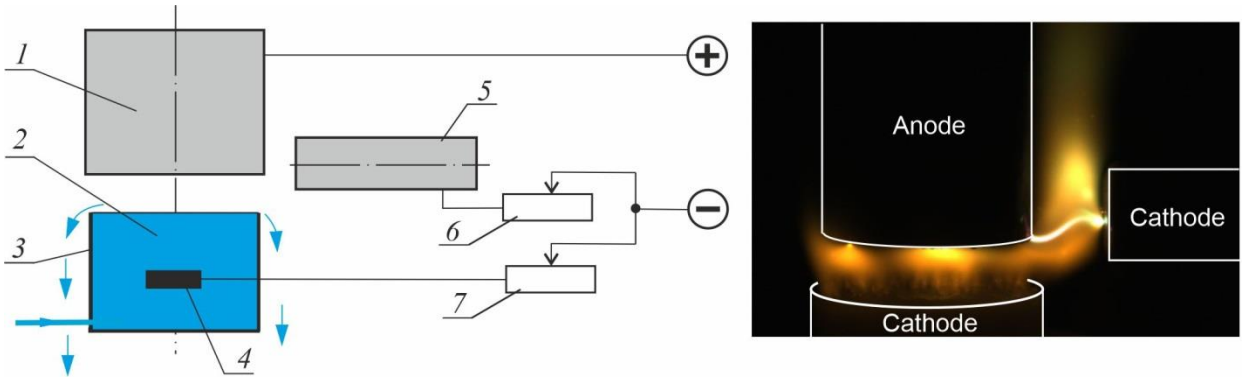

Fig. 1. Diagram of the experimental setup and snapshot of the discharges.

The gas discharge current with a liquid electrolyte cathode was set in the range of 5-10 A, and arc current varied in the range of 1-10 A. Aqueous solutions of sodium chloride with a specific electrical conductivity of 10-15 mS/cm were used as a liquid electrolyte. Spectra of radiation of plasma were investigated. Intense spectral lines of hydrogen were recorded.

In configuration of the electrodes shown in fig. 1, the electric arc was displaced upward under influence of plasma flow and heated gases. Its spatial position was constantly changing. In this work, other options for location of electrodes were investigated. The search for conditions under which the steady burning electric arc occurs was carried out.

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