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The book contains abstracts of oral and poster reports presented at the 15th International Conference "Gas Discharge Plasmas and Their Applications" (GDP 2021). This event is a continuation of conferences on gas discharge physics held in Russia since 1984, as well as seminars and conferences on the technological application of low-temperature plasma. The conference is held every 2 years in different cities of the Russian Federation. This year, the wonderful city of Ekaterinburg, located in the heart of the Urals on the border of Europe and Asia, was chosen as the venue. The program of the Conference covers a wide range of technical areas and modern aspects of the physical processes occurring in generators of low temperature plasma, low and high-pressure discharges, pulsed plasma sources, surface modification, and other gas-discharge technologies.

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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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