STAND FOR STUDYING PROCESSES OF INITIATING LONG-TERM CURRENT DISCHARGES [[1]](#footnote-1)\*)

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Glinov A.P., Golovin A.P., Shaleev K.V.

Institute of Mechanics, Lomonosov Moscow State University, [krestytroitsk@mail.ru](mailto:krestytroitsk@mail.ru)

One of the technical problems in the experimental study of extended (several cm or more) arcs is the problem of stable initiation of the discharge and ensuring minimal interference to the measuring circuit. In particular, when initiating a discharge in atmospheric air at an interelectrode distance of 15–18 mm, oscillator voltages of more than 50 kV were required [1]. Therefore, in the study of extended electric arcs at the discharge installation of the Research Institute of Mechanics of Moscow State University, the initiation of the discharge is applied by closing the electrodes with their subsequent extension to the selected interelectrode distance. The discharge initiation system [1] ensured the extension of the electrodes in a small range of velocities of the order of 200 mm / s and was distinguished by insufficient stability of operation. At present, a stand has been developed for obtaining an extended (up to half a meter) electric arc plasma generated during the initiation of a quasistationary air arc of atmospheric pressure at different modes of electrode expansion, in particular, a device has been developed for electrode expansion at different (40 - 400 mm / s) speeds. The stability of such a system is increased due to both the selection of load balances and the choice of control voltage on the electric motor of the sliding system.

A diagnostic system has been developed: interelectrode gap, three components of the magnetic field induction vector, arc current and interelectrode gap voltage, electrode temperature. Visualization of the discharge is carried out by means of high-speed (1200 - 4000 frames / s) panoramic video shooting of the discharge gap. The registration of the interelectrode gap is provided based on the digitization of the potentiometer readings (with an accuracy of fractions of mm) connected by a cable with a sliding system. To register the components of the magnetic field induction vector, a measuring probe was developed on the basis of the created assembly of three mutually perpendicular Hall-type plate-sensors of the Honeywell type ss495A1.

At a new stand, an experimental study of extended (up to 40 cm) arc discharges in a free air atmosphere between graphite electrodes - a rod cathode and massive anodes was carried out. Discharge currents were - up to 700 A. It has been shown that optimization of the electrode extension modes and coordination of electrode assemblies makes it possible to obtain stable combustion of extended electric arcs in an open air atmosphere up to 30 cm. The work was performed at the Institute of Mechanics of Lomonosov Moscow State University (state contract No. AAAA-A16-116021110198-5) with financial support from the Russian Federal Property Fund (grant No. 18-29-21022).

References

1. German V.O., Glinov A.P., Golovin A.P., Kozlov P.V., and Lyubimov G.A. // Plasma Physics Reports, 2013. Vol. 39. No. 13. P.1142-1148.
2. A.P. Glinov, A.P. Golovin, P.V. Kozlov, K.V. Shaleev, G.A. Lyubimov, "Study of arc discharges on the P-2000 facility" J. Phys.: Conf. Ser. 1250 01 2019.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/Pt/ru/GM-Glinov.docx) [↑](#footnote-ref-1)