ABOUT STABILIZATION OF ELECTRIC ARCs IN EXTERIOR TANGENTIAL MAGNETIC FIELD

V.O. German, A.P. Glinov, A.P. Golovin, P.V. Kozlov, and K.V. Shaleev

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

Report is devoted an experimental research of action of exterior (preferentially tangential) magnetic field on stability of an electroelectric arc between rod graphite electrodes in open aerial atmosphere. Experiments are spent by the help of the magnetic system [1] created on the basis of set of the linear currents, formativing exterior in relation to the discharge a magnetic field oriented or in a direction of a magnetic field, generated by a natural current of initially unperturbed pole of an arc, or against it. Unlike operations [2, 3] variants of power supplies of magnetic system as blanket with the discharge, and from an independent radiant are viewed.

Experimental researches have been grounded on diagnostics and the analysis of oscillograms of a current and a voltage on a discharge gap and on visualisation of discharge processes. The velocity video shooting synchronised with record of oscillograms was spent. Video shooting parametres: velocity – 1200–24000 f/s, exposure time – 1–25 µs. It has been spent more than 100 startings. The interelectrode distance (*l*id) varied within 1–70 mm. Gamuts of discharge currents (I) and currents of magnetic system (Im) are dilated to 1.2 кА. Number of the linear currents in magnetic system varied in limits: N = 1–6.

As a result of the analysis of the data gained in spent experiments, it is shown that discharge stability boundaries essentially depend on quantity and a direction of currents of the discharge and magnetic system, interelectrode distance and radius of magnetic "crate" (R = 40–50 mm) and numbers of the linear currents. Data about influence of an exterior magnetic field on a motion of the arc pole, the sizes and velocities of travel of its basic stains and dynamics of streams from them is improved. Data about dynamics of electrical resistance of the discharge depending on spotting parameters of studied system is obtained. It has allowed by an estimate (on three-dimensional projections of video images of the discharge) lengths of an axis of a pole and an electric intensity (under oscillograms) to spot dynamics of a medial electrical conductivity and temperature of plasma [4]. It is observationally shown that at independent power supplies of the magnetic system creating a magnetic field, influencing the current channel, parameter magnification δ = Im/I (the magnetic factor) exist inferior (δ–) and upper (δ+) stability boundaries: δ– ~ 1, δ+ ~ 3. Influence of an exterior magnetic field on stabilisation of a motion and the spatial shape of a pole of an arc and near electrode cords is tracked. It is scored that for traffic control of stains stronger fields, than for guidance of the arc pole are necessary.

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References

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