ABOUT DYNAMICS OF ANODE spots AND MACROPARTICLES IN ELECTROELECTRIC ARC ON GRAPHITE ELECTRODES

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Report is devoted an experimental research of features of dynamics of basic anode stains of the free aerial arc of atmospheric pressure and graphite electrodes taking off from a surface (3OPG[1]and superficial silicon on a bottom 3OPG graphite) macroparticles. Processes of formation and travel of basic stains of arcs and erosion of electrodes are most full studied in vacuum [2 - 4]. However in arcs of atmospheric pressure these processes become complicated, in particular, interaction of flying particles and moving stains with the dense aerial medium. The examinations conducted in the present operation are grounded on diagnostics and the analysis of oscillograms of a current and a voltage on a discharge gapand visualisation of discharge processes. Video shooting parametres: velocity – 1200-24000 f/s, an exposure – 1-25 µs. The experimentsspent on installation of scientific research institute mechanics of Moscow State University PLAZMA-2000 in time of 2009-2014 are discussed,for discharges between rod electrodes at currents to 400 A and interelectrode gaps to 6.5 sm, both with an exterior magnetic field, and without it. In the spent experiments velocities of macroparticles in anode flow ~ 10 km/s irrespective of orientation of electrodes in relation to gravity are gained. Flying particles are braked by the cathode stream, stop in it, and then communicate its stream.

Modes of the discharge with a circular motion of a basic anode stain on a face surface of an electrode are found and estimated. The rotary motion of an anode stain (and, hence, and all anode stream) has centrifugal action on arc plasma, and can lead to formation of screw structure of the arc cord. Such intensive gyration of a stream causes the corresponding strong enough vortex rotational air round the anode. Typical velocities of travel of anode stains in the discharge without superimposition of an exterior magnetic field are ~ 10 km/s. At magnetic field superimposition both accelerationand deceleration of travel of basic anode stains [5] is possible depending on its direction.

Tracks enough large (to 1 mm) the particles flying from a surface of the anode in a direction of the cathode, and their interaction with the cathode stream are tracked. Stabilisation expedients (amplitude reduction) studied by authors before [6] oscillations of a trunk of an arc in a vertical direction are discussed at horizontally located electrodes, both by means of superimposition of an exterior magnetic field, and by means of periodic injection of a stream of microparticles from the anode.

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