ELECTRODE EROSION IN PULSED HIGH PRESSURE ARC WITH CURRENT UP TO 1.5 MA

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The discharge channel is contracted in discharges of megaampere range at high and super high pressure due to thermal contraction and pinch-effect. In this case the magnitude of current density j average on electrode can reach 10^6-10^7 A/cm^2. The density of energy on electrodes surface q in the specified conditions becomes comparable to density of a laser radiation of the moderate and high power. Thus, also as well as under the influence of laser radiation, the erosive jets are formed resulting in sharp increase of voltage drop in near electrode zones.

The estimation of time of the beginning of an erosive jet corresponds to registered time of voltage drop increase near the electrodes. Estimations of a weight relation of eroded electrode between a liquid and gaseous phase depending on magnitude q, and also experimental data on the anode and cathode erosion at currents to 1.5 MA and j to 2×10^6 A/cm^2 are represented.

At $q \sim 10^9$ W/cm^2 the discharge burns completely in the vapors of eroded electrode material. Thus, the value of specific erosion of 4×10^{-2} g/C corresponds to erosion arising at formation of cavity under the influence of laser radiation.

Existence of a new type of erosion in the form of symmetric ejection from all surface of electrodes end faces is confirmed. It is connected with infringement of balance between the pressure above the surface of an electrode which counterbalances magnetic force, and pressure in the depth of a superficial layer of an electrode end face.