Plasma–liquid interaction during a pulsed vacuum breakdown

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The dynamics of phase changes in the material of a copper cathode during the explosion of a microprotrusion on its surface under the action of the explosive electron emission current has been numerically simulated. Numerical data have been obtained that characterize the interaction of the liquid metal and the dense cathode plasma that are formed due to the microprotrusion explosion. It has been shown that under the action of the pressure exerted by the plasma, the liquid metal is almost completely displaced from the zone of operation of the cathode spot of the vacuum discharge. This leads to the formation of a crater on the cathode surface with microirregularities at its edge. Thus conditions are created for the formation of new microprotrusions, which, when exploding, provide self-sustained and cyclic operation of the vacuum discharge.