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Conditions of formation of Taylor cone shaped asperities on metal surfaces by the action of PEDM

ABSTRACT

The paper deals with the conditions for extraction and freezing of asperities in the form of Taylor cones from the metallic surfaces under the action of pulsed electric discharge machining. It is demonstrated that due to the presence of strong electric fields (greater than 10^8 V/m) generated by the presence of anode and cathode spots and under the simultaneous action of weight forces, as well as those of surface tension on the surface of the liquid metal, it develops disturbances and propagates capillary waves. As a result, conical asperities are extracted from the surface, with the top angle of 90° . In the case of sudden cooling, these can be frozen in this state. A singular or multiple asperities simultaneous in the shape of Taylor cones can be obtained by solitary electrical discharges under certain energy and time conditions.