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Modeling of electrochemical machining with the use of a curvilinear electrode and a stepwise dependence of the current efficiency on the current density

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Abstract

© 2016, Pleiades Publishing, Ltd. An analytical solution of the problem of electrochemical machining of metals by a curvilinear cathode tool with allowance for a discontinuous function that describes the dependence of the current efficiency on the current density is obtained. According to the hydrodynamic interpretation, the original problem reduces to the problem of the theory of ideal fluid flows with a free surface. It is demonstrated that the use of the proposed dependence of the current efficiency on the current density ensures the existence of three domains on an unknown treated surface; these domains have different laws of the distribution of the charge fraction spent on metal dissolution. Results calculated for various particular cases are presented.

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Keywords

electrochemical machining of metals, free surface, hydrodynamic analogy, potential