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Effect of the breakdown time of a passive film on the electrochemical machining of rotating cylindrical electrode in NaNO_3 solution

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Abstract

In electrochemical machining (ECM), a passive film is generally present on the anode surface at low current density but is broken down at high current density in a passivating electrolyte. This film can impede unwanted metal dissolution in a low-current-density region and thereby improve the accuracy of ECM. However, it may sometimes affect metal dissolution at high current density. In this paper, the breakdown time of the passive film is determined for different current densities by varying the applied anodic potential pulses. It is found that the breakdown time has a significant magnitude of a few seconds, which can be long enough to affect metal dissolution in ECM.

To illustrate the effect of the breakdown time of a passive film, ECM tests with

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