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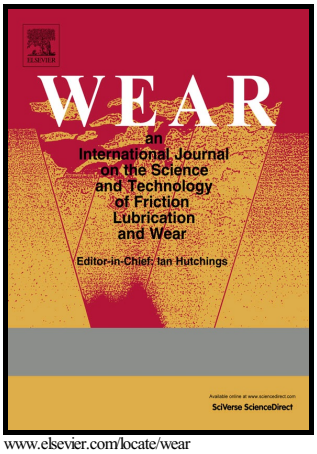

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Wear model for describing the time dependence of the material degradation mechanisms of the AISI 316L in a NaCl solution

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Abstract

The tribo-electrochemical behavior of AISI 316L has been investigated under tribocorrosion conditions in a 3% NaCl solution and the material damage evolution with time has been analyzed. A numerical contact model based on a Boundary Element Method (BEM) has been developed in order to determine the contact pressure distribution and to quantify the worn material as a function of time. The time dependence of the tribological behavior of the material has been described. At the initial state, the high contact pressures generate a material flow causing an increase in the worn area. After around 300 cycles, the Archard wear model linearly describes the wear evolution with time. The proposed model describes the evolution with time of the wear profiles of the tested material and takes into account the plastic behavior of the material during the first cycles.

Keywords: tribocorrosion; austenitic stainless steel; ball-on-disc; numerical modelling; wear quantification

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