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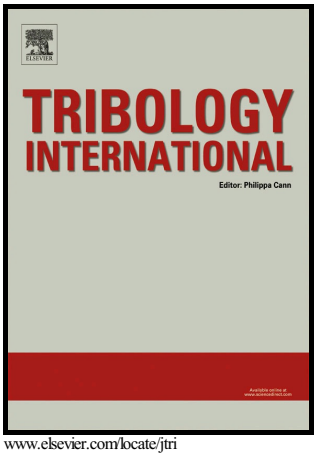

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Predicting a contact's sensitivity to initial conditions using metrics of frictional coupling

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Abstract

This paper examines two metrics of frictional coupling, which are then used to predict how sensitive a frictional contact's steady-state behavior is to its initial conditions. Based on a large set of numerical simulations with different contact geometries, material combinations, and friction coefficients, a contact's sensitivity to initial conditions is found to be correlated with the product of the coupling metric and the friction coefficient. For cyclic shear loading, this correlation is maintained for simulations with different contact geometries, material combinations, and friction coefficients. However, for cyclic bulk loading, the correlation is only maintained when the contact edge angle is held constant.

Keywords: frictional coupling; fretting; shakedown; contact

1. Introduction

Engineered structures often comprise multiple components that are fastened together at frictional interfaces, and these interfaces are frequently subjected to a static load superposed with a oscillatory load (e.g. due to vibrations). Applications in which these loading conditions arise include riveted and bolted joints [1, 2], dove-tail connections in jet engines [3, 4], and spline couplings [5, 6]. Although the interfaces in components such as these usually appear to be stuck together, zones of *micro-slip* commonly develop

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