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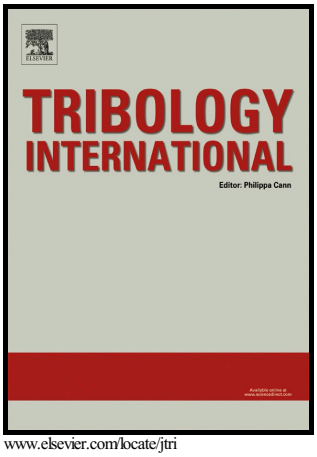

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Evolution of bi-Gaussian surface parameters of silicon-carbide and carbon-graphite discs in a dry sliding wear process

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Abstract:

A surface-surface dry sliding wear of silicon-carbide and carbon-graphite discs is performed on a rotational tribological tester. Coefficient of friction (*COF*) is monitored as a function of time. Samples are measured by a white light interferometer. Four uniform groups, each with two repetitions, are set to different test durations to investigate the evolution of bi-Gaussian surface parameters in a wear process. The results show that the hard sample has a smoothed upper component with time, but a slightly changed lower component due to wear-generated debris. The wear-generated debris, however, introduce deep scratches to the soft sample before its upper component being altered, yielding a sharp lower component. Furthermore, the correlation between bi-Gaussian surface parameters and *COF* is explored.

Research highlights:

▸Evolution of bi-Gaussian surface parameters in a dry sliding wear process is investigated.

▸Silicon carbide and carbon graphite, widely used in mechanical face seals, are selected.

▸Correlation between bi-Gaussian surface parameters and coefficient of friction is explored.

Keywords: dry friction; sliding wear; surface parameter; stratified

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1 Introduction

Sliding wear is among the most complex wear mode [1] where the surface is one subject of interest. Many researchers tried to characterize the changes of microstructure to reveal the nature of sliding wear, because the surface works as the fingerprint of a component [2–6]. Therefore, understanding surface parameters is of primary importance.

The arithmetical mean deviation *Ra* and the root-mean-square deviation *Rq* are widely used. They can embody the deviation of the surface data. *Rsk*, termed as skewness, is the 3-order central moment to capture the asymmetry of a surface. The skewness of zero corresponds to a symmetric shape, while the negative and the positive skewness, respectively, describe a surface with more peaks under the mean plane and a surface with high peaks but shallow valleys. *Rku*, termed as kurtosis, is the 4-order central moment to identify the central (or spread) level. A centrally distributed surface corresponds to a