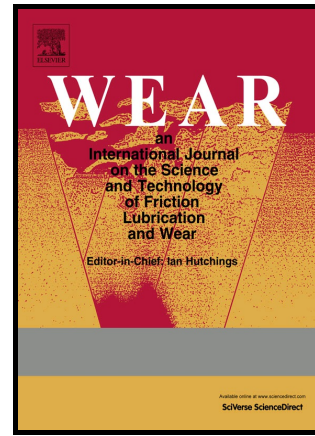


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Understanding the Occurrence of a Wavy Wear Track on Elastomeric Materials

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Abstract

Elastomeric materials are used in daily applications, such as tires and conveyor belts. Sliding friction of elastomeric materials often produces a unique periodic wear pattern. In general, the periodic wear pattern has to be prevented because it generates surface instabilities and, as a result, vibration. Sliding contact between an elastomer and a rigid ball may cause the development of a periodic wear pattern like a wave on the elastomer surface, called a wavy wear track. The present study has investigated the occurrence of the wavy wear track on the elastomers under several operating conditions. The elastomers used were a Styrene-Butadiene Rubber (SBR) and Butadiene Rubber (BR) reinforced with two types of fillers, i.e., highly dispersible silica and short-cut aramid fiber. A pin-on-disc tribometer was used to study the wavy wear track of the materials under several operating conditions. An analytical model was used to predict the wave length of the wear pattern and to study the occurrence of the wavy wear track. The results show that the occurrence of the wavy wear track depends on the mechanical properties of the elastomer, the operating conditions (such as sliding velocity and force), the inertia mass of the counter surface frame and the circumferential length of the wear track. The analytical model is in good agreement with the experimental results.

Keywords: Styrene-Butadiene Rubber (SBR), Butadiene Rubber (BR), elastomer, sliding friction, wear, wavy wear track.

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