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FRICTIONAL BEHAVIOR OF GLASS-CLEANING CLOTHS: A STUDY OF STATIC AND KINETIC COEFFICIENTS AT LOW SLIDING SPEEDS

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Abstract

In this paper the authors experimentally investigated the dry sliding friction between the cloth for wiping glasses in sliding contact with a glass surface. Our aim was not only to understand the mechanical properties of this interaction but also to assess its environmental implications and potential for pollution reduction. A single degree-of-freedom mass-spring system has been adapted to the UMT-2 tribometer. A mass having 242 grams was sliding on his plane surfaces covered by a special cloth on glass surfaces with a linear speed varied between 0.05 and 8mm/s. As function of the linear speed, important variation of the static and kinetic friction coefficient has been obtained. Three different behaviours of the friction between soft material and glass surface have been evidenced: stick-slip for very low linear speed, a sudden decreasing of friction force with a continuum sliding and an increasing of friction force from adherence to a continuum sliding. The Kato's equation for dependence of the static friction coefficient with the adherence time has been correlated with experimental results. Have been proposed and verified with experiments both a similar Kato's model for variation of the kinetic friction coefficient with linear table speed and the variation of the kinetic friction coefficient with sliding speed. These findings contribute to a deeper understanding of dry friction in soft materials and have potential implications for optimizing materials used in glass cleaning applications, reducing excessive wear, and minimizing material waste.

Key words: cloth-glass friction, environmental impact, sliding speed, soft materials, static friction coefficient, stick-slip

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