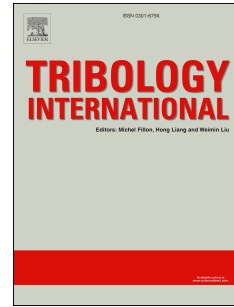


Accepted Manuscript

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PII: S0301-679X(17)30599-6

DOI: [10.1016/j.triboint.2017.12.041](https://doi.org/10.1016/j.triboint.2017.12.041)

Reference: JTRI 5025

To appear in: *Tribology International*

Received Date: 9 September 2017

Revised Date: 4 December 2017

Accepted Date: 27 December 2017

Please cite this article as: Cesini I, Ndengue JD, Chatelet E, Faucheu J, Massi F, Correlation between friction-induced vibrations and tactile perception during exploration tasks of isotropic and periodic textures, *Tribology International* (2018), doi: 10.1016/j.triboint.2017.12.041.

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Correlation between friction-induced vibrations and tactile perception during exploration tasks of isotropic and periodic textures

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Abstract

The sliding contact between the finger and the surface of an object generates vibrations that propagate into the skin and activate the mechanoreceptors. The characteristics of the vibrating signals give information about the texture features, affecting the tactile perception. Previous studies have focused on the relation between the physical characteristics of the surfaces and the detected signals. This study investigates the direct correlation between contact-induced vibrations and tactile perception of textures. Two sets of samples were investigated: periodic samples and isotropic samples. Within the same set, each sample exhibits a clearly distinct surface roughness relative to one another. Sensory tests were conducted with blind people to evaluate the tactile discrimination of the samples as a function of roughness. The analysis of the Root Mean Square of the acceleration and the acceleration spectra obtained for the different samples, allowed explaining the mismatch between the actual roughness of the samples and the roughness perceived by the subjects, which is directly related to the induced vibrations.

Keywords: Friction-induced vibrations, Tactile perception, Periodic Textures, Isotropic Textures, Duplex perception theory, Topography

1- Introduction

When seeing or touching the surface of an object, information are kept and encoded in order to make perceptual decisions and appreciate surface properties. Touch modality results to be predominant in the evaluation of object texture and roughness [1] and the analysis of the tactile sense applies to many fields: ergonomics of everyday objects; textile quality [2–4]; identification of

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