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# Fingertip friction and tactile perception of materials

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## Abstract

Friction plays a key role in the perception of materials upon active tactile exploration. We will present fingertip friction data for participants who explored surfaces with microstructures of varying, parameterized scale. On the one hand, we explore the relative importance of skin physiological parameters for the measured friction coefficients. On the other hand, we explore if human participants can perceive friction differences. These friction differences arise from different structure sizes in the microstructures (1), from varying sliding speed (2), or from lubrication by viscous liquids. Our results indicate a perceptual constancy, which allows participants to correctly rank friction coefficients at varying speeds and normal loads. We will discuss the analysis of large sets of friction data by advanced data processing methods such as UMAP.

(1) M. Fehlb, K.-S. Kim, K. Drewing, R. Hensel, R. Bennewitz, Perception of Friction in Tactile Exploration of Micro-structured Rubber Samples, in: H. Seifi, A.M.L. Kappers, O. Schneider, K. Drewing, C. Pacchierotti, A. Abbasimoshaei, G. Huisman, T.A. Kern (Eds.) Haptics: Science, Technology, Applications, Springer International Publishing, Cham, 2022, pp. 21-29.

(2) M. Fehlb, E. Monfort, S. Saikumar, K. Drewing, R. Bennewitz, Perceptual Constancy in the Speed Dependence of Friction During Active Tactile Exploration, IEEE Trans. Haptics, DOI 10.1109/TOH.2024.3493421 (2024) 1-8.

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