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Just-Noticeable Roughness Differences of Technical Sounds

Leutheuser, Alexandra[a], Sottek, Roland[b] and Becker-Schweitzer, Jörg[a]
[a]Fachhochschule Düsseldorf
[b]HEAD acoustics GmbH
alexandra.leutheuser@gmx.net

Roughness has become a central focus for product sound design. The roughness-induced perception, varying from a sporty character to a very unpleasant impression, consistently proposes new questions and challenges in sound engineering. This paper is concerned with one of the important aspects of subjective roughness perception: the investigation of just-noticeable roughness differences. Listening tests using synthetic sounds (modulated sinusoids with additional noise) and technical sounds (based on engine sounds) have been performed, both dependent on parameters such as degree of modulation, sound pressure level, and signal-to-noise ratio. The influence of a single parameter and of a combination of parameters was studied using adaptive test procedures providing more reliable and precise results within a limited time for the subjective tests. The results of the studies will be discussed. Further investigations relate to using the results for optimizing the roughness calculation based on the Hearing Model according to Sottek with respect to technical sounds.

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