

Title: Status quo of standardizing tonality calculation of stationary and time-varying sounds

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For many years in various product assessments, tonality measurement procedures such as the Tone-to-Noise Ratio (TNR), Prominence Ratio (PR) and DIN 45681 Tonality have been applied to identify and quantify prominent tonal components. Especially through the recent past as product sound pressure levels have become lower, disagreements between perceptions and measurements have increased across a wide range of product categories including automotive, Information Technology and residential products. One factor is that tonality perceptions arising from spectrally-elevated noise bands of various widths and slopes and from non-pure tones as well as from discrete (pure) tones, and from combinations of these, can be mis-measured or escape measure in “hybrid” sound pressure based tools and tools sensitive only to discrete tones. To address such issues, a new perceptually-accurate tonality assessment method based on a hearing model of Sottek was developed which evaluates the nonlinear and time-dependent loudness of both tonal and broadband components, separating them via the autocorrelation function (ACF) and giving their spectral relationships. This new perception-model-based procedure, suitable for identifying and ranking tonalities from any sources, is proposed for the next edition of ECMA-74 as an alternative to the existing methods TNR and PR (ECMA-74, Annex D).

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