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Title:

How binaural measurement technology and psychoacoustics have changed acoustic measurement technology

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Abstract:

In the 80s of the last century, the automotive industry developed an interest not only to measure the interior noise level of a vehicle, but also to determine the acoustic sound quality. The annoyance of a noise or the attributes of good sound could not be described by the A-weighted sound pressure level. The desire arose to include human hearing into the analysis. However, artificial head stereophony, which was used in the broadcasting sector, proved to be unsuitable for enabling a faithful reproduction of vehicle interior noise. An improved, calibratable and free-field equalized artificial head measurement technology was developed with technical properties comparable to human hearing combined with headphone playback to generate same hearing events as in the original. Furthermore, based on digital signal processing, possibilities were created to change signals in the time and frequency domain in real time to audibly assess which signal characteristics influence the sound quality. With the help of psychoacoustics, calculation methods could quantitatively describe the sound impressions perceived by hearing. Meanwhile, the ISO 12913 Soundscape standard defines the recording and assessment of an acoustic environment in context, whereby binaural measurement technology is normatively requested, and the use of psychoacoustic parameters is recommended.