GLADEN®
MOSCONI
NEXT LEVEL CAR AUDIO

AURES

AURES, a binaural in-situ probe measuring system

Development of a practical hardware solution as well as a suitable algorithm for the associated volume and loudness.

A new procedure. It allows the user comfortably the acoustic properties of car audio systems

- precise in situ measurement.
- Automated binaural evaluation
- Corrections can be corrected according to hearing requirements or corrections can be output graphically or as a file for semi-automatic use..

Hardware

- The AURES consists of two measuring probes and the associated electronics, which one person (as part of the measuring equipment) uses and inserts directly into the auditory canals (Insitu, lat. ≈ to the place of the event). Comparable to in-ears or hearing systems. An important feature here is that after each removal, the sound pickups return to the same position in the auditory canal with millimetre precision when inserted again. This is due to the shape of the complete unit, which fits almost snugly into the anatomy of the ear. Measurement tolerances due to differing positioning are minimized and reproducible measurement results up to 20 kHz are made possible.

- The probes of the AURES influence the acoustics in the auditory canal less than +- 1 dB on average. The influence of the sound field between the auricle and the ear canal entrance and its influence on the HRTF remains correspondingly low. In the reverse conclusion (simple practical test) there is no noticeable difference in hearing with or without the probe microphones.

  This is possible by placing the actual microphone behind the ear and connecting it via a 0.9 mm thick sound tube in the ear canal. Tricky, tube length, diameter and coupling volume in front of the microphone capsule form an acoustic unit with the counterpressure of the ear canal volume, which effectively minimizes tube resonances.

  The sound tube end in the ear canal, the sound tube opening, is provided with a thin silicone guide which guides the tube end approx. centrally in the ear canal, thus avoiding the transmission of structure-borne sound from the edge of the ear canal to the sound tube. The end piece also has the task of keeping the sound tube sufficiently stable in the ear canal so that it does not change its position during head movements or even slip out.

- very small or large ear canals, both the sound tube and the end pieces are available in three different sizes. They can be easily changed without tools if required.

- The probe unit can also be disassembled into two parts. After opening the bayonet fitting and removing the sleeve with sound tube, a high-quality measuring microphone is obtained. It serves as a calibration basis. No further reference measuring microphone is required to create the characteristic of an individual outer ear transfer function as a basis for the measurements.

- A suitable holder for the reference microphones was also considered in order to make the measurements for creating the individual characteristic as comfortable as possible..

- The dimensions of the microphone unit behind the ear are 6.5 x 20 mm, which means that the HRTF is not significantly affected. The precision

required for this miniaturization in parts production and assembly is Made in Germany.

- Meassurment during driving the car, the driver can be uese it in the same time. Carrying the probe unit does not restrict driving ability, thus enabling convenient measurement and creation of corrections suitable for driving operation.

Acoustic properties

- Only one correction curve is required per individual ear, as all other directional HRTF differences, as given in a natural environment, are automatically measured 1:1 in the auditory canal.

- The measurement is performed by one person. As a matter of principle, no further error-prone correction is necessary, as is the case with a technical replacement (dummy head).

- - Influences of head movement, different sitting positions are, as given as natural movement, recorded realistically. In practice, repeat measurements are highly consistent. This provides safety in practical operation. For typical influences on defined position changes (lateral head movement, distance between headrest and differing body size), experience values are quickly obtained which allow a good estimation of the respective relevance of a position change.

- The calibration of the AURES takes individual anatomical characteristics into account. This enables personalized measurement. For example, a sound system can be personalised to the driver and also to vehicle owner. Uncertainties regarding the right correction curve are minimized in comparison to the dummy head, as these are created for the AURES individually for each person or their body.

Psychoacoustic evaluation

- Humans always hear with both ears. In perception, an auditory event is formed from the sum of the two ear signals. The AURES algorithm calculates the volume = loudness from both probe signals.
  Psychoacoustic perception characteristics are taken into account.

Thank you for your interest, if you have any questions, please do not hesitate to contact me.

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