A coupler-based calibration method for ear-probe microphones

The calibration of ear-probe microphones can increase the precision of calibrating stimulus levels in situ and of measuring acoustic responses from the ear. This paper proposes a methodology to measure the sensitivity of an ear-probe microphone, requiring only an acoustic coupler and a calibrated reference microphone. The input impedance of the coupler is measured, enabled by a preliminary acoustic Thevenin calibration of the ear probe, and the plane-wave transfer impedance of the coupler is calculated analytically. Using these two quantities, the pressure transfer function between the reference microphone and the ear-probe microphone is estimated. This enables estimating the sensitivity of the ear-probe microphone. The proposed and an existing method were compared, resulting in substantially similar ear-probe microphone sensitivities. The proposed method is practically feasible in producing reliable measurements of sound pressure in the ear canal and calibrating stimulus levels in a clinical setting.

General information
Publication status: Published
Organisations: Department of Electrical Engineering, Acoustic Technology, Interacoustics A/S
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Pages: 2294–2299
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Journal of the Acoustical Society of America
Volume: 144
Issue number: 4
ISSN (Print): 0001-4966
Ratings:
BFI (2018): BFI-level 2
Scopus rating (2018): CiteScore 1.92 SJR 0.726 SNIP 1.186
Web of Science (2018): Impact factor 1.819
Web of Science (2018): Indexed yes
Original language: English
DOIs:
10.1121/1.5064283
Source: PublicationPreSubmission
Source ID: 157812471
Research output: Contribution to journal › Journal article – Annual report year: 2018 › Research › peer-review