

Reciprocal measurements of transfer functions for auralization

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Many applications in acoustics, such as transfer path analysis and synthesis (the well-known tools for troubleshooting and sound design of vehicle interior or exterior noise), require the measurement of transfer functions.

Several methods are available to determine the transfer functions between identified sources and selected receiver locations. For example, transfer functions can be obtained by means of direct or reciprocal measurements. Due to errors and restrictive constraints during the measurements, the results of the two methods differ.

The quality of measured transfer functions must be evaluated with respect to the auralization of the synthesized receiver signals or even the auralization of individual noise shares caused by a specific source and transmitted via one or a combination of paths.

This paper compares the different measurement techniques of transfer functions in theory and in practice. Application examples (simple mechanical structure and vehicle) are presented on the one hand to illustrate the advantages of reciprocal measurements, and on the other hand to sensitize for potential drawbacks caused by the different sources of errors.

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