Institute of Fundamentals and
Theory in Electrical Engineering

BA-Thesis/TI-Project/MA-Thesis
Uncertainty of Impedance Tube Measurements

Motivation

Measurements of the acoustical properties of a material in an impedance tube are thought of as a reliable source of information regarding the absorption coefficient α. However, recent research showed, that factors such as the actual measurement setup, the specimen production, the person performing the measurement, and others can be inferred back from the measurements using an explainable machine learning approach (Stender *et al.*, JASA 2021). Thereby, it was found that the operating person influences the absorption coefficient in an even more blurred way than the sample thickness.
In this project, you will partially reproduce the results of the previous publication with the Brüel&Kjaer impedance tube. The aim is to deduce guidelines that help to reduce the measurement uncertainty with respect to the above factors.

The work should ideally be done by 1-2 students in cooperation! It is scalable between bachelor thesis, master project/TI-project, and master thesis.

Research Questions

- Do the Brüel&Kjaer impedance tube measurement results have similar uncertainties as reported in the literature?
- Which factors create the most uncertainty and how can the uncertainty be reduced?

Tasks

- Plan and perform a set of absorption coefficient measurements using the impedance tube. Investigate factors such as different cutting techniques or sample mountings.
- Apply an explainable machine learning approach to your data set and find the most prominent factors that increase the uncertainty.
- Present your progress and document the results.

Organisation

- Language: English or German
- Start: immediately possible
- A starting point to the literature is provided

Contact/Supervisors

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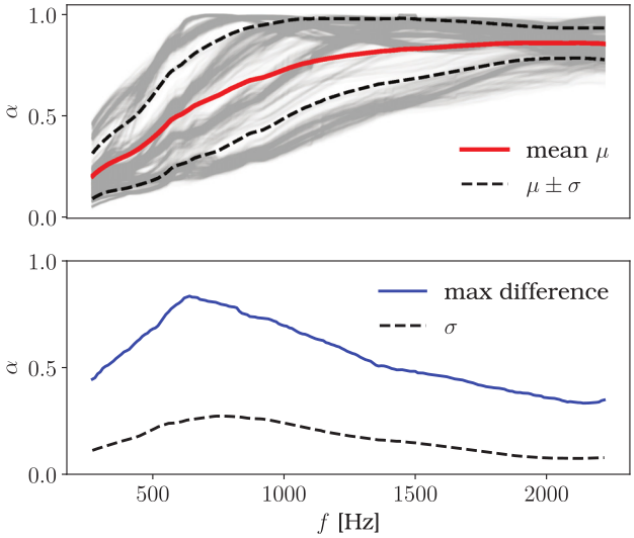

Mean and variance of measured absorption coefficients of the same probe. (Stender *et al.*, JASA 2021)