Diploma-Thesis

Active Noise Control in Acoustic Tube Systems

The aim of this diploma thesis is to design and implement an active noise control system capable of exciting a pressure wave at the end of a circular tube, while actively cancelling out reflected waves. The system components, including the microphone(s) and speaker, as well as the acoustic domain, will be modeled. A controller will then be designed to regulate the speaker's voltage based on the excitation signal and the feedback received from the microphone(s). In the experimental setup, two or more microphones will be placed near the speaker to decompose the measured pressure wave into incident and reflected parts. The controller will be implemented using an FPGA based system to process the system inputs in real time, while appropriately controlling the output voltage to the speaker. For verification, additional excitation and measurement equipment can be installed in the tube to measure incident and reflected waves and excite "reflected" waves for testing.
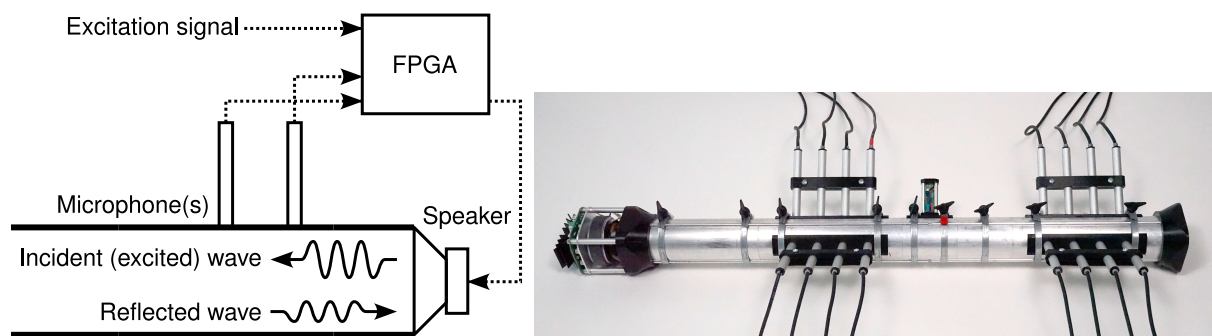

Abbildung 1: **Left:** Active noise control for exciting and removing wave components in a tube. **Right:** Currently used impedance tube measurement setup, that will be adapted for the designed active noise control system.

Requirements/Interests:

- System modeling and controller design
- Measurement technology and acoustics
- Software or hardware implementation of control systems.
- Python and MATLAB programming.

Keywords: Research / Modeling / Implementation / Measurement

Subject: Modeling and experimental verification

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