

Investigation of coupled FEM simulation and impedance matching of piezoelectric ceramic transducers

✓ Bachelor- / Studien- / Masterarbeit

Piezoelectric transducers exhibit strongly geometry- and boundary-condition-dependent electrical and mechanical behavior. Modern manufacturing technologies enable free-form geometries, allowing resonances, side modes, and overall impedance levels to be tailored deliberately. The aim of this work is to develop and validate a reliable workflow that combines coupled electro-mechanical FEM simulation with experimental impedance measurements to design impedance-matched piezoelectric transducers

Tasks:

- Set up and calibrate an impedance measurement test bench
- Perform measurement campaigns on reference and free-form geometries
- Derive geometry-based design guidelines for impedance matching

Nature of the study: Experimental and simulation-based research combining numerical FEM modeling and laboratory impedance measurements

You will learn: Coupled-field FEM simulation of piezoelectric materials (ANSYS), Impedance measurement techniques and calibration, Validation strategies: Simulation ↔ Experiment

Additional information:

- You select language of the work, either German or English
- Multiple works on same topic possible (e.g. Studienarbeit + Masterarbeit)

