Calibration of aerodynamic probes: Development of a GUI & Improvement of data reduction algorithms

An aerodynamic probe must be calibrated before using it in an unknown flow field. In a free-jet facility combinations of velocities and angles are set. The measurand (e.g. voltage or pressure) are recorded with the probe. At the Chair of Aerodynamics and Fluid Mechanics hot-wire probes (constant temperature anemometry) and pressure probes are used in wind tunnel experiments. There are reduction algorithms which post-process the measured data in order to finally get the flow parameters of interest. These post-processing codes often rely on interpolation schemes. The main goal of this thesis is the development of a MATLAB GUI (App Designer) for probe calibration data and the reconstruction of measurements. Furthermore, the improvement of the calibration code itself and hence, the increase of its usability is desirable. Work packages include the optimization of the MATLAB (pressure probe) and Fortran (hot-wire) codes, migration in different programming languages (Fortran → MATLAB) and the development of a robust GUI.

![Figure 1: Flowchart of Calibration GUI](image1)

![Figure 2: Flowchart of Calibration Test GUI](image2)
Preliminary work packages:

1. Familiarization with working principles of (multi-hole) probes and hot-wire measurements
2. Familiarization with existing codes (MATLAB/Fortran)
3. Development of GUI: Calibration and Reconstruction
4. Migration to newer/more performant programming languages (Fortran → MATLAB)
5. Optimization of data reduction codes

If you are interested in this topic or you have questions, feel free to contact me.

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