Technische Universität Braunschweig | Institut für Strömungsmechanik
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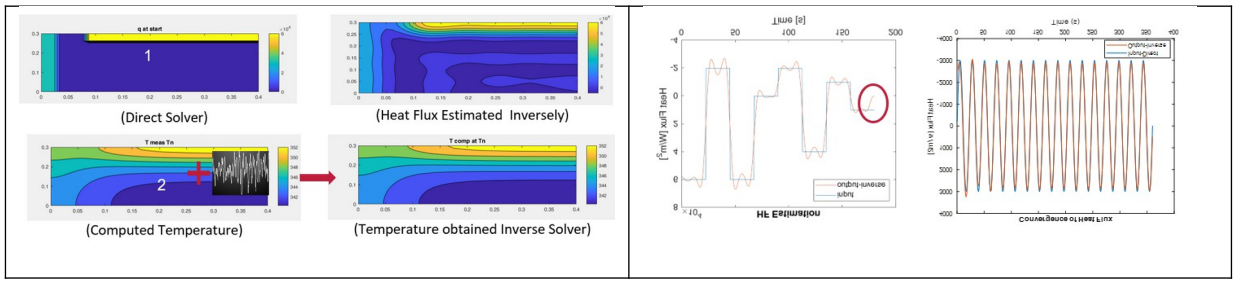
Master Arbeit/ Thesis: Estimation of Heat Transfer Coefficient on Airfoil- Inverse Heat Conduction Solver Development (Posted on 13.09.22)

Heat transfer determines the rate of ice accretion, shape, and the extent of icing on aero-structures. Despite, its importance, the heat transfer data on an iced airfoil is limited due to the unavailability of appropriate instrumentation. In this quest, ISM developed a tool to inversely estimate the heat transfer rate from easily measurable temperatures. The tool is validated with a flat plate setup. A Master Thesis can be realized by extending this to arbitrary 3D surfaces (like iced airfoil). Another Master Arbeit/thesis is envisioned, where the other student concurrently designs the experimental setup and obtains the experimental icing data which will be processed with the inverse code. Possible to extend to Master thesis with the measurements of artificial roughness induced heat transfer augmentation.

Basics of Inverse Heat Conduction: The unknown surface boundary conditions (BCs) are estimated using an adjoint based conjugate gradient optimizer that minimizes the error between the computed Thermal response (with guessed BCs) and the measured temperatures.



Your Work:

- Familiarize with Thermal Solver using MATLAB tool box
- Coupling the tool box with inverse solver
- Validate the results with the existing results for a heated flat plate
- Validation with simulated measurements
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Further Activities:

Obtaining temperature evolution on existing NACA0012 airfoil and estimating heat transfer coefficients

Requirements

- Good understanding of Heat Transfer
- Familiar with Finite Volume and Finite Difference Methods
- Familiar with Matlab and/or other programming languages

Are you **interested?** For more information, please contact.

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