

Adjoint Optimization of Air Inlet for Fuel Cell Aircraft

Studienarbeit / Masterarbeit at the ISM

The use of a hydrogen fuel cell represents one of the most promising technologies for the electrified propulsion of sustainable future aircraft. However, the design of the air inlet system for the fuel cell presents a significant challenge. The shape of the inlet has a direct influence on the pressure loss and the uniformity of the air as it flows to the fuel cell, which in turn impacts the total drag of the aircraft. Therefore, it is essential to optimize the aerodynamic shape in order to estimate the inlet shape that offers the optimum benefit for the aircraft.

Tasks

- CFD analysis of reference inlet geometry to estimate pressure recovery and total drag on the simplified nacelle model
- Testing of Adjoint optimization framework in open source CFD solver SU2
- Adjoint shape optimization of the air inlet geometry

Requirements

- Interest in aerodynamics and CFD
- Basic knowledge of Linux and Python programming
- Knowledge of CFD solvers (Study will be performed in SU2)

