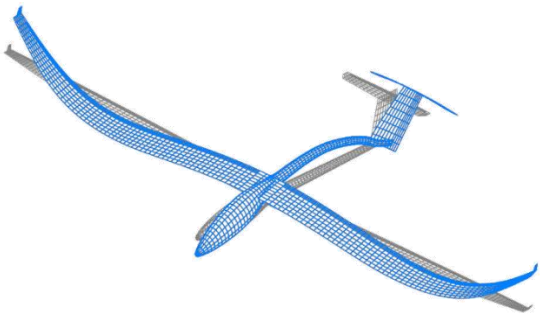
MA

Technische Universität München

Fakultät für Luftfahrt, Raumfahrt und Geodäsie
Lehrstuhl für Luftfahrtsysteme

Implementation of an Aerodynamic Solver for Aeroelastic Simulation of Sailplanes



Motivation

In the scope of the ProFla project (Process Chain Flutter), an aeroelastic process chain is being created with which small aircraft with highly stretched wings can be efficiently developed and safely certified at an early design stage. In addition to researching the aerodynamics of modern laminar airfoils, this includes the development of a numerical tool chain and its validation through extensive ground and flight tests. For this purpose, suitable computational methods will be implemented to enable automatic adaptation of the simulation models to experimental results.

Topic

For the safe operation of a glider up to the certified maximum speed, freedom from flutter must be ensured, i.e. no undamped vibrations may occur. Numerical methods (finite element methods) are used to calculate the structural dynamics. For the calculation of the aerodynamic forces, various methods exist (e.g. lifting line method or vortex lattice method), which are coupled with a structural model.

The aim of this work is to create an aerodynamic model from the geometric data of the lift surfaces of a representative example aircraft using various methods (e.g. lifting line method, vortex lattice method). For this purpose, appropriate functions are to be implemented in an existing geometry tool. The model will then be verified with a static analysis in Nastran.

Working Packages

WP1: Literature research and familiarization with existing software

WP2: Implementation of functions for the generation of an aerodynamic model into an existing geometry tool

WP3: Creation of an aerodynamic model for the calculation of aerodynamic forces

WP4: Iterative solution of aerodynamic forces and structural deformations

WP5: Model verification by means of a static aeroelastic analysis in Nastran

Requirements

- Interest in the topic
- Independent working style
- Programming experience desirable
- Knowledge in aerodynamics advantageous

Period

starting immediately

Supervision

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