Bachelor Thesis/Term Project (Semesterarbeit)/Master Thesis/ Interdisciplinary Project (IDP)
at the Institute of Helicopter Technology

Helicopter Fluid-Structure Coupling using preCICE

Background:

In the rotorcraft field, the aerodynamics and structural dynamics are mutually dependent. In general, the rotor performance and structural loads are modeled by means of comprehensive rotorcraft analysis tools. These software packages solve the blade motion and the rotor trim conditions. However, the aerodynamic phenomena such as the rotor wake or rotor inflow are predicted using lower-order aerodynamic models.

In order to improve the numerical accuracy of the fluid-structure interaction on the blade, the rotor comprehensive analysis tools are coupled with computational fluid dynamic tools that solve the 3D Navier-Stokes equations and can provide 3D advanced aerodynamic calculations.

This study aims to couple the comprehensive aeromechanics rotor code CAMRAD II with the finite volume CFD solver TAU. **preCICE** will be used as a coupling library for information exchange between the **CFD (TAU) and CSD (CAMRAD II)** solvers. Within the scope of this work, a **preCICE adapter** for TAU and for CAMRAD II will be developed. The consideration of the fluid structure interaction should increase the predicted accuracy of the solutions for the rotor performance and loads. In future investigations, the developed adapters will allow the investigations of adaptive azimuth-dependent structural deformations on a rotor (see Figure).

Skills:
Python Programming, Data Handling

Language:
German or English

Start:
Flexible (Best February 2019)

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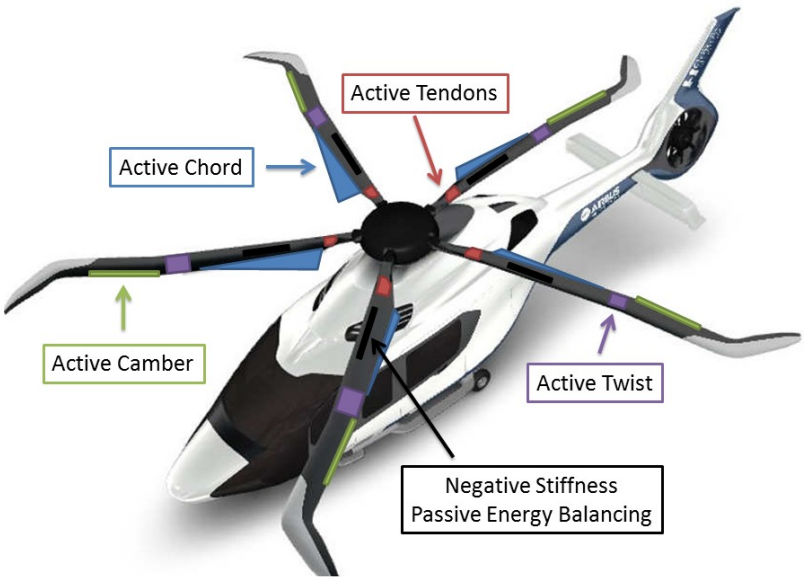

Figure: Shape adaptive blades as envisioned by SABRE