



## Bachelor Thesis / Project Thesis / Internship

### Validation of a Coupled CFD-Rigid-Body Dynamics Method based on Store-Release Experiments

#### Background:

For simulations of gust encounters and maneuvers of aircraft DLR's flow solver TAU was coupled with a rigid body dynamics (RGB) solver. Latter calculates the movement of the aircraft regarded as rigid body under the influence of aerodynamic forces and moments calculated by the the flow solver. Though the coupled solver has already been applied occasionally to maneuver and gust encounter simulations of generic aircraft [1,2], further testing and validation of the solver is still pending. However, validation data for these kinds of simulations is scarce. Primarily measured data from experiments with released stores is available for use in code validations.

#### Work content:

You will conduct CFD-rigid-body dynamics simulations with the developed coupled solver for selected store release scenarios. You will evaluate your simulation results and prepare them for the comparison with the available experimental data, such as trajectories, pressure distributions at discrete time points, etc. You will assess the coupled simulation process regarding the achieved agreement with the experiments and you will identify potential improvements in the coupled solver.

#### Requirements:

Valid candidates should have or are willing to fastly acquire the following skills

- Comprehensive understanding of aerodynamics and flight mechanics
- Programming skills in Python (or related scripting languages)
- Experience with Unix/Linux OS

#### References:

- [1] Heinrich, R., Reimer, L., Michler, A.: Multidisciplinary simulation of maneuvering aircraft interacting with atmospheric effects using the DLR TAU code. RTO AVT-189 Specialists' Meeting on Assessment of Stability and Control Prediction Methods for Air and Sea Vehicles, Portsmouth West, UK, October, 2011
- [2] Heinrich R., Michler A.: Unsteady simulation of the encounter of a transport aircraft with a generic gust by CFD flight mechanics coupling. In Proceedings of the CEAS 2009 European Air and Space Conference, October, Manchester, UK, 2009

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