	INTERNSHIP 5-6 MONTHS **YEAR 2023**
Internship tutors: Yoann LE LAMER yoann.le-lamer@isae-supaero.fr Emmanuel BENARD emmanuel.benard@isae-supaero.fr	Internship with ISAE SUPAERO – Toulouse Targeted level: final year of Diplôme d'Ingénieur or MSc in Aerospace-Mechanical Engineering Grant: standard ISAE-SUPAERO rates, approx. 600 euros/month

Aerodynamic computations (CFD) and meshing strategies for strut-braced wing configurations

Context:

ISAE-SUPAERO is an institute dedicated to aerospace engineering higher education and research. ISAE-SUPAERO develops a research focused on the future needs of aerospace or high-tech industries. The ISAE-SUPAERO Department of Aerospace vehicles design and control (DCAS) supports activities related to the design and development of aerospace systems. The proposed project will contribute to computational methods to be used for the evaluation of high-aspect wings transport aircraft, studied within the European project U-HARWARD [1] [2].

Objectives:

The aerodynamic analysis is mandatory in the Overall Aircraft Design (OAD) process of FAST-OAD (https://github.com/fast-aircraft-design/FAST-OAD), jointly developed with ONERA [3]. The objective of this internship is to perform CFD computations with DAFOAM / SU2 for strut-braced wing (SBW) configurations for later use in high-fidelity aerostructural design studies. First, it would require to develop a method to parametrize SBW geometries for a given set of parameters (to be determined). Then, solver-compatible meshes will need to be generated using ANSYS. Finally, results will be analyzed and compared to those obtained with existing meshes generated with different tools for multiple aircraft configurations. Besides, parametric studies will be carried out on strut characteristics.

Missions:

- Familiarize with the use of DAFOAM / SU2 solvers on existing cases
- Develop a method to parametrize a SBW geometry (strut-wing attachment position: sweep angle, spanwise position)
- Generate corresponding meshes with ANSYS, and compare to results obtained with existing meshes
- Run CFD on SBW configurations and carry out a parametric study on strut characteristics
- Analyze and compare results for different aircraft configurations

[1] https://www.u-harward-project.eu/
[2] Carrier G., Arnoult G., Fabbiane N., Schotté J.-S., David C., Defoort S., Delavenne M., Bénard E. (2022). Multidisciplinary analysis and design of strut-braced wing concept for medium range aircraft. SciTech conference,2022.
[3] David, C., Delbecq, S., Defoort, S., Schmollgruber, P., Benard, E., & Pommier-Budinger, V. (2021). From FAST to FAST-OAD: An open source framework for rapid Overall Aircraft Design. In IOP Conference Series: Materials Science and Engineering (Vol. 1024, No. 1, pp. 012062). IOP Publishing.

REQUIRED SKILLS

Skills : Python programming (essential), aircraft aerodynamics (essential), computational fluid dynamics (CFD, ideally with OpenFoam and/or SU2), aerodynamic mesh generation, reporting (English)
Soft skills : Autonomy, reporting & scheduling, curiosity, knowledge of aviation