	INTERNSHIP 5-6 MONTHS **YEAR 2021**
Internship tutors: Emmanuel BENARD emmanuel.benard@isae-supaero.fr Martin DELAVENNE martin.delavenne@isae-supaero.fr	Internship with ISAE SUPAERO – Toulouse Location: **TBD** Grant: standard ISAE rates, approx. 600 euros/ months

Development of a CFD computation platform for preliminary aircraft design

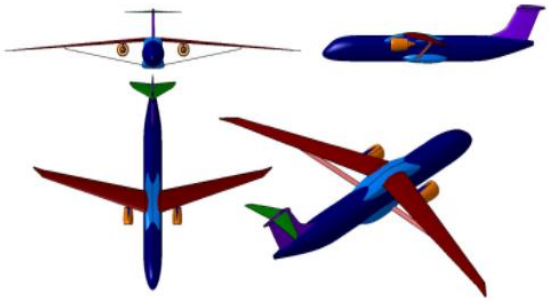
Context:
ISAE-SUPAERO is an institute dedicated to aerospace engineering higher education and research. ISAE-SUPAERO develops a research focused on the future needs of aerospace or high-tech industries. The ISAE-SUPAERO Department of Aerospace vehicles design and control (DCAS) supports activities related to the design and development of aerospace systems.

The internship subject is within the scope of the chair AIRBUS-ISAE CEDAR II for Eco-Design of Aircraft. This chair is intended to conduct different actions in order to contribute to the sustainable development of future air transportation, taking into account the many dimensions of that ambition (environment, society, economic & industrial issues …). This internship is also related to the European project U-HARWARD which aims to study high-aspect ratio wings concepts. The analysis of these configurations necessitates higher fidelity methods (such as CFD) than those currently used in aircraft design tools.

Objectives:
This internship proposes to develop processes and methods to analysis new aircraft configuration embedded laminar flow technologies and / or strut-braced high-aspect ratio wings. A particular focus will be put on the capability to generate surrogate models aimed at correcting lower fidelity approaches such as VLM.

Missions:

- Benchmark open source CFD solvers available using CRM and / or PADRI configurations as reference.
- Justify the solver selection with respect to capabilities in handling laminar/turbulent transition, different solver types (Euler/RANS) and interface with other disciplines such as structural analysis, heat transfer;
- Propose a choice of computational chain, from pre-processing to post-processing, with reference to aircraft design requirements;
- Consider the integration of far-field analysis within post-processing;
- Implement a basic methodology to design a contamination free laminar wing, ideally based on Euler simulations;
- Develop a capability to generate surrogate-models based corrections for VLM computations using CFD data



PADRI Configuration from [1]

[1] Aeronautic and aerospace European platform website, https://aerospace-europe.eu/case-studies/a-common-platform-for-validation-of-aircraft-drag-reduction-technologies/definition-of-the-test-case/

REQUIRED SKILLS

Skills : Python Programming (essential), knowledge of CFD (Fluent, starCCM+, …), knowledge of surrogate-models
Soft skills : Autonomy, Curiosity, Innovation, Aviation