Foreseeing the next generation of Aircraft

PRESS RELEASE

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The EU-funded FALCON project is launched.

Direct aviation emissions accounted for 3.8% of total CO^2 emissions and 13.9% of the emissions from transport in the EU in 2017, making aviation the second biggest source of greenhouse gas emissions after road transport. In addition, although the noise emissions of each aircraft have decreased approximately by 75 % over the last 30 years, the growing amount of air traffic means that many European Union (EU) citizens are still exposed to high noise levels.

Intensified research and innovation activities are therefore needed to reduce impacts and emissions of aviation (CO^2 and non-CO^2, noise, manufacturing) for the EU to reach its policy goals of a net-zero greenhouse gas emissions by 2050. One of the main levers to decrease CO^2 emissions is to reduce the airframe structural weight.

As an answer, FALCON's ambition is to develop a hybrid approach combining cutting-edge numerical and experimental methods to analyse fluid-structure interaction, better predict and control unsteady aerodynamic loads, thus improving the aeroelastic properties and sustainability of aerostructures and reducing the related aerodynamical noise. This will ultimately contribute to upscale the current design capabilities of the European aircraft industry while enhancing the digital transformation of the European supply chain.

Building upon three industrial test cases and tight links with key European partnerships such as Clean Aviation, four specific objectives will be pursued:

- To capture the essential fluid-structure interaction phenomena occurring in realistic aeronautical conditions combining experiments and simulations through the establishment of a reference set of industrial test cases.
- To simulate the aeroelasticity and related noise emissions occurring in realistic aeronautical conditions thanks to high-fidelity and high-performance Lattice Boltzmann Method frameworks.
- To increase the use and access of high-scalable high-performance computing frameworks for industrial fluid-structure interaction applications, while obtaining cost-efficient and timely results.
- To control the aeroacoustics and aeroelastic instabilities originating from fluid-structure interaction using multi-fidelity optimization.

The project will take the industrial leadership of aeronautical industry in Europe forward, aligning the outcomes of the project towards noise and fuel reductions, as well as towards sustainability improvements of global air transport.

FALCON held its first consortium meeting on 31 January – 1 February 2024 in Marseille (France) with the participation of all 15 project partners and their affiliated entities from 6 countries. The official Launch allowed the consortium members to discuss the project's objectives and the industrial test cases. A representative of the European Commission acknowledged the strategic importance of the project for the aeronautical industry in Europe.

"*FALCON is pushing the limits of our actual capabilities and knowledge on Fluid-Structure Interaction (FSI) phenomena in realistic aeronautical conditions. Thanks to cutting-edge lattice Boltzmann simulations, state-of-the art experiments and multi-fidelity optimization, our ambition is to progress on the understanding of real-life FSI mechanisms to upscale the European aeronautic industry.*", comments project coordinator Prof Julien Favier from the laboratory Mécanique, Modélisation et Procédés Propres (M2P2), a joint research unit affiliated with Aix-Marseille University, the CNRS and Centrale Méditerranée.

Ramón Abarca from AIRBUS Operations S.L. says that "FALCON *aims to provide pragmatic capability to simulate fluid-structural coupling of airflow detachment interaction with high flexible structures. With the future aircraft weight efficiency and noise targets, it becomes relevant to streamline such predictive capabilities on localized aircraft areas where the flexible components are subjected to local flow separation on certain conditions*."

To learn more about FALCON visit the project's website at https://falconproject.eu

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