Embedded Life-Cycle Management for Smart Multimaterials Structures: Application to Engine Components

MORPHO FINAL CONFERENCE

NEXTAIR (GA 101056732)

multi-disciplinary digital - enablers for NEXT-generation AIRcraft design and operations

Project objective

Mitigating aviation's impact on climate change requires major transformations in aircraft configurations and operations. Digital methodologies that optimize aircraft performance will play a key role in this transformation.
Through eight industrial test cases and for 36 months, the NEXTAIR project will build and validate:
- ✓ **novel design methodologies;**
- ✓ **data-fusion procedures;**
- ✓ **smart health assessment tools.**

Together, these solutions will lead to the digital transformation of aircraft design, manufacturing, and maintenance. The project will improve methods to better tackle the uncertainty in manufacturing and the variability in operating conditions for the industrial, multi-disciplinary design of aircraft and engine components.

Consortium composition:
- ✓ Coordinated by ONERA
- ✓ 16 partners
- ✓ 9 leading research organisations
- ✓ 4 aeronautical companies
- ✓ 3 innovative SMEs

ONERA
THE FRENCH AEROSPACE LAB

Expected results and impact

NEXTAIR will :
- ✓ Increase modelling and simulation capabilities for new disruptive concepts and breakthrough technologies.
- ✓ Account for manufacturing uncertainty and operational variability in the industrial MDO.
- ✓ Extend the usability of machine learning techniques to design and maintenance.

This will contribute to:
- ✓ Open the way to increased synergies and feedback among design, manufacturing, and Maintenance-Repair-Overhaul phases in the aircraft life-cycle.
- ✓ Enable flawless entry into service and continuous airworthiness of European aircraft of all platforms.
- ✓ Support the development of any new aircraft configurations considering green technologies.
- ✓ Reinforce EU leadership position in the growing market of aviation digital transformation.

Test Cases (TCs)

TC1: High Aspect-Ratio Wing small-medium-range configuration

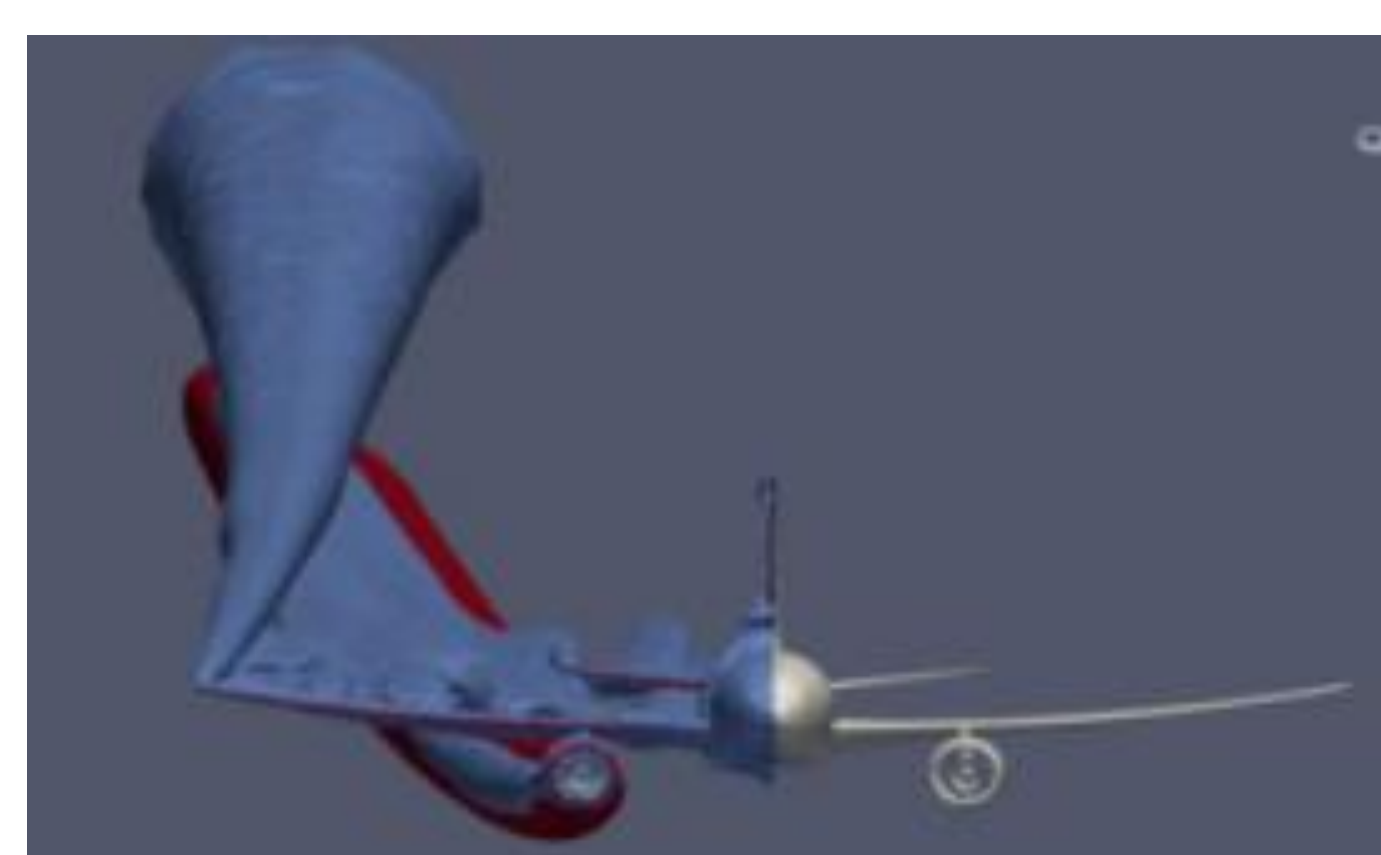TC2: Laminar High Aspect-Ratio Wing business jet configuration

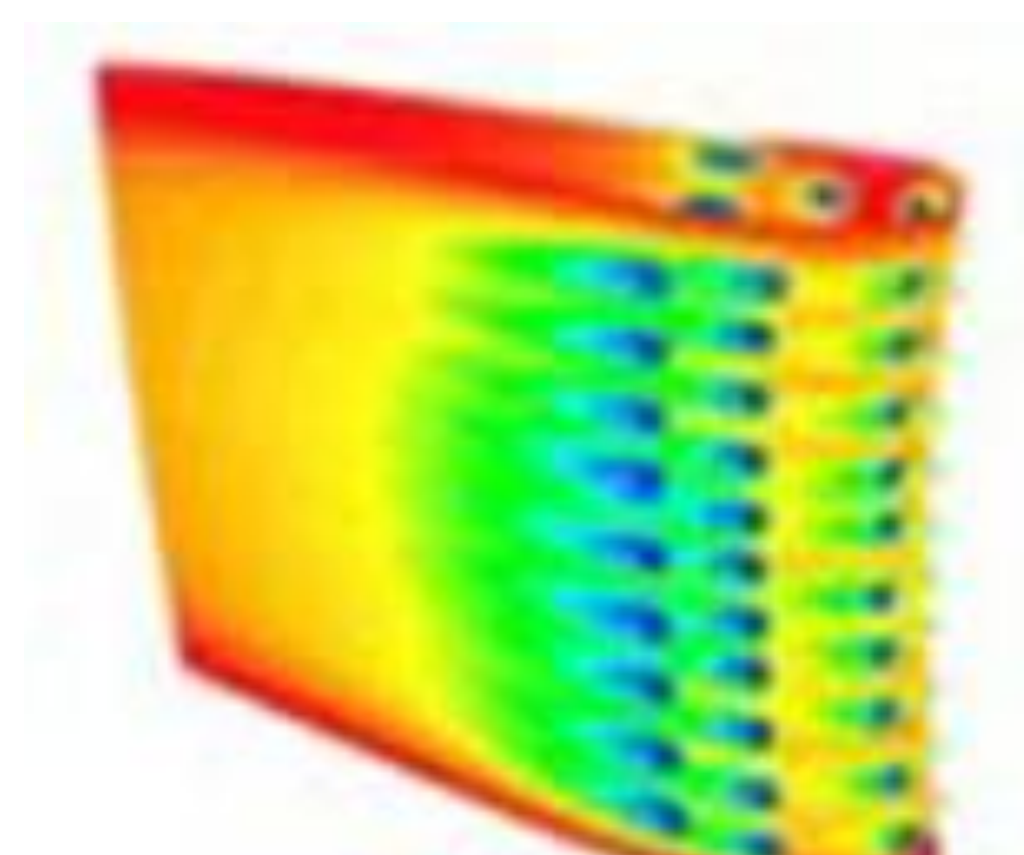TC3: Ultra High Bypass Ratio fan

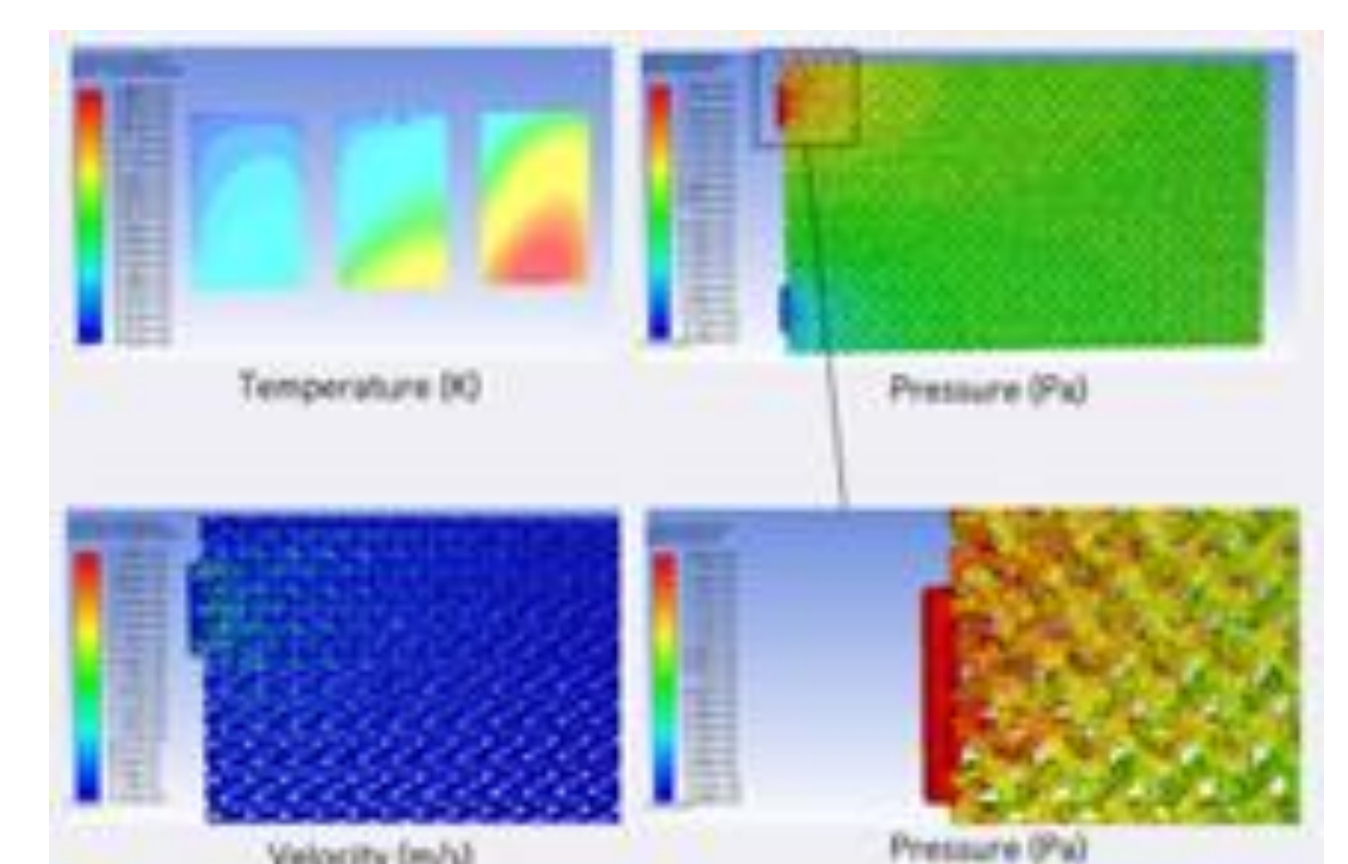TC4: Unducted Single Fan (USF)

TC5: Wing-USF engine aero-propulsive interactions

TC6: Wing-engine-exhaust interactions

TC7: High-pressure turbine

TC8: Heat exchanger for hybrid electric engine

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