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STS 02

EU-Funded Research on Advanced Computational Methods for Fluid Dynamics and Aero-Acoustics

Chair: Daniele Violato[1] and Leonidas Siozos-Rousoulis[2]

European Commission – INEA, 1049 Brussels, Belgium
[1] daniele.violato@ec.europa.eu
[2] leonidas.siozos-rousoulis@ec.europa.eu

Session Abstract

Keywords: *Computational fluid dynamics, computational aeroacoustics, multidisciplinary optimisation, high-fidelity numerical methods, aircraft flight physics*

The Flightpath 2050 vision sets ambitious goals for the European aviation sector. Reducing environmental impact, as well as maintaining and extending industrial leadership will continue to be key drivers for aviation. To this end, streamlined design and manufacturing processes are required, in order to achieve reduced aircraft design costs and time.

Fast and accurate modelling of flight physics can significantly contribute to reducing the aircraft design-cycle, obviating the need for costly prototyping and testing during development stages. More importantly, advanced computational methods are key enablers for the development and design of future disruptive configurations.

In the high-level international setting of the WCCM-ECCOMAS Congress 2020, the European Commission and the Innovation and Networks Executive Agency (INEA) are organising a dedicated session on advanced numerical methods for flight-physics modelling.

The objectives of the STS are:

1. To present an overview of current EU-funded research on computational methods for flight-physics modelling and a snapshot of progress at European and international levels;

2. To identify gaps between needs and the current state of the art, and gather recommendations on specific topics, which should be addressed in the short, medium, and long term, including aspects such as:
   - progress on research topics considered in ACARE STRIA (e.g. Challenges 1, 2, and 3);
   - high-fidelity computational fluid dynamics (CFD) capable of modelling turbulent and transitional flows, and the role of artificial intelligence and high-performance computing;
   - high-fidelity computational aeroacoustics (CAA) techniques for prediction of aerodynamic noise (e.g. engine, airframe, and interaction noise);
   - multi-disciplinary optimisation (MDO) methodologies, which can be integrated into the aircraft design-cycle to drastically reduce design cost and time;

3. To bring together relevant EU and international aviation R&I stakeholders.

List of session papers and speakers:

Assessment of a BEM Approach for CROR Performance and Radiated Noise Prediction
(EU-Project ARTEM)
Jacopo Serafini, Caterina Poggi, Giovanni Bernardini, and Massimo Gennaretti

Developments in Aeroelastic Gust Modelling for Aerospace and Wind Energy
(EU-Project AEROGUST)
N.N.

On the Interaction between Fuel Sloshing and Flexible Aircraft Wings - Experiment Scalability
(EU-Project SLOWD)
Francesco Gambioli, Airbus, L. Gonzalez, UPM, F. Saltari, Sapienza Univ. Rome, Michael Wright, University of Cape Town, South Africa, P. Behruzi, Ariane Group, Bremen, J. Martinez, UPM, L. Costantin, Univ. of Bristol, U.K.

Aerodynamic Performance Increase for a High-lift Two-element Configuration of a morphing A3xx Wing by Means of Numerical Simulation
(EU-Project SMS)
A. Marouf, N. Simiriotis, Y. Bmegaptche, IMFT, Toulouse, Y. Hoarau, Univ. of Strasbourg, J.F. Rouchon, LAPLACE, Toulouse, G. Harran, Marianna Braza, IMFT, Toulouse

Title tbd.
(EU-Project TurboNoiseBB)
Lars Enghardt, DLR, Berlin? (tbc.)