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STS

Disruptive Aircraft's Wing Configurations towards Greening of Aviation

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Session Abstract

Keywords: *Smart Morphing and Sensing, Wing Design, High-Fidelity Numerical Simulations, Aerodynamic Performance, Emissions Reduction*

The present STS at ECCOMAS 2024 will include five contributions concerning novel wing morphing, able to drastically increase the aerodynamic performances leading to a considerable fuel's consumption decrease and noise sources reduction**.** Emphasis will be attributed in the efficiency of multiscale electrical actuations with increased DoF over strategic areas of the lifting structures. The presentations analyse the morphing effects on the fluid-structure interaction, beneficially manipulating the surrounding turbulence towards drag reduction, increase of lift and noise sources attenuation. The new morphing designs ensure a considerable energy decrease for the propulsion, beneficial for all sources of renewal energy.

These studies are a continuation from the EU-funded Horizon 2020research project N° 723402 SMS, "Smart Morphing and Sensing for aeronautical configurations", https://cordis.europa.eu/project/id/723402 and www.smartwing.org/SMS/EU.

They are performed in the context of the HORIZON-EIC-2023-PATHFINDER Project N° 101129952 – BEALIVE, "Bioinspired Electroactive multiscale Aeronautical Live skin", https://cordis.europa.eu/project/id/101129952.

The presentations included in this STS analyse through High-Fidelity numerical approaches, the effects of spatial and temporal modulation of the actuation frequencies and amplitudes applied through novel smart actuators disposed in a distributed way on the "skin" of the lifting structure. These designs are able to produce optimal interfacial layers interacting with the coherent and chaotic turbulence structures and applying deformation of strategic parts of the wing.

The topic of this session prepares future wing design for aeronautics industrial applications aiming at saving energy and at reducing the pollution through these new, *multiple-degrees-of freedom morphing concepts*, enabling a considerable reduction of emissions, meeting the targets fixed by Flightpath 2050: Europe's Vision for Aviation [1].

[1] European Commission, DG MOVE/ DG RTD, Flightpath 2050: Europe's Vision for Aviation: Maintaining global leadership and serving society's needs, Publications Office, 2012, https://data.europa.eu/doi/10.2777/15458.