STS-01

Advances in Materials, Structures and Manufacturing for Aeronautics Applications

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Session Abstract

Keywords: *Lightweight materials, composite structures, multifunctional materials and structures for weight saving, reduced manufacturing cost*

According to the Strategic Research and Innovation Agenda of the *Advisory Council for Aviation Research & Innovation in Europe* (ACARE), new technologies, materials, manufacturing processes and system concepts are vital for the European aviation sector.

Environmental protection is, and will continue to be, a key driver for aviation. The environmental goals in Flightpath 2050 recognise the need for aviation to accelerate its effort nuisance and air quality for the benefit of all citizens and to allow sustainable traffic growth.

For future airliners, the airframes, including cabin interiors, must contribute benefit from increased innovation in lightweight materials, including composites. Their use will require new approaches to design and manufacturing, with multifunctional materials and structures for weight-saving, reduced manufacturing cost and increased production rate. Design for end-to-end performance improvement must be achieved with multidisciplinary approaches such as multi-criteria optimisation and digital model based engineering.

In this session, experimental and numerical technologies and new research of advanced materials, structures and related manufacturing processes for applications in aerospace will be presented.

Amongst others, a numerical simulation methodology of Additive Manufacturing process for open lattice cellular materials will be presented. Investigations of new composite structures on their mechanical and dynamic behaviour will be addressed.

The following papers will be presented:

Numerical Modelling and Mechanical Behaviour of Cellular Materials Produced by Additive Manufacturing Process
George Lampeas, Harry Psihoyos and Spiros Pantelakis, Univ. of Patras, Greece

Active Vibration Control of Lattice Core-Sandwich Structures Using Macro-Fiber Composite Actuators
Narasimha Rao Mekala and Kai-Uwe Schröder, RWTH Aachen University, Germany

Numerical Analysis of a Mechanical De-Icing Process by Low Frequency Oscillation of a CFRP layer
Felix Grubert, Miguel Nuño Spiewak and Kai-Uwe Schröder, RWTH Aachen Univ., Germany

The implementation of a Novel Holistic Index for the Optimization of the Automated Fiber Placement Process with Regard to Quality, Life Cycle Costs and Environmental Performance
Christos Katsiropoulos and Spiros Pantelakis, Univ. of Patras, Greece