STS-18

Advanced Optimisation Methods and Tools Tackling the Climate Change – Applications to the Design of Innovative Aircraft & Aero-engine Architectures

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Session Abstract

Keywords: *Low-carbon fuel propulsion, emission reduction, optimization methods, novel aircraft architecture, evolutionary algorithms*

As mentioned in the editorial of a recent Clean Sky document 'Skyline', Europe has on it shoulders the urgency of addressing climate change. In that respect, universities, research organizations and industry will continue their effort in Horizon Europe to work on a new Clean Aviation programme.

For achieving the ambitious goals for aircraft emission reductions, novel aircraft architectures using low-carbon fuel need to reduce drag, emissions and also noise to counter the environmental impacts of aviation. Optimised solutions for novel approaches have to be developed.

In this challenging and ambitious context, this STS will propose advanced numerical methods and tools with their associated software for optimising greener aircraft and aero-engine design using hybridized adjunct methods, evolutionary algorithms and games strategies, developed by research institutions and installed in the industrial design environment.

To support the increasing global demand for air travel and achieve significant CO^2, NOx and Noise emission reductions, the aviation industry has more intensively to develop environmentally friendly technologies and their implementation in the novel aircraft generations.

Contributors of this STS will address new concepts and methods for design optimization and for reducing significantly emissions aiming for a decreasing aviation impact on the environment.

The following papers will be presented in this STS:

Optimization of a Turbine Inlet Guide Vane by Gradient-based and Metamodel-assisted Methods
Mohamed H. Aissa, Roberto Maffulli, Lasse Mueller and Tom Verstraete, VKI, Brussels, Belgium

Non-cooperative Game Hybridization of a Memetic Optimization Approach
Jordi Pons-Prats, Martí Coma, Gabriel Bugeda, CIMNE/ UPC, Barcelona, Spain

Game Theory and Multi-Objective Optimization: A Review of Concepts and Methods and their Extension to Solving Huge-Scale Optimization Problems
Zhili Tang, Shaojun Luo, Haiqin Li, NUAA, Nanjing, China, Jacques Periaux, CIMNE, Barcelona, Spain

Gust Load Alleviation by Circulation Control for Future Greener Aircraft
Ning Qin, Univ. of Sheffield, Sheffield, UK