Aerospace Europe Conference 2023
Joint 10th EUCASS – 9th CEAS Conference

Abstract #XXX *(to be filled by the organizers)*
Preferred Topics: SYSINT/ SUSTAV
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Type: Oral
Status or corresponding author: Regular

Title

A MBSE-based framework for aircraft systems design and evaluation.

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Abstract

A raising number of flights has increased the impact of aviation on the environment. To mitigate these impacts, the Clean Sky 2 initiative [1] has set goals for the aviation industry to reduce fuel consumption, CO_2 emissions and perceived noise for the next generation of commercial aircrafts. To meet these goals, there is a huge effort on the development of new technologies for aircraft systems design and their integration as an aerospace system's lifecycle today encompasses a varying range of engineering disciplines and models at different levels of abstraction and complexity. The collaborative project Modelling and Simulation tools for Systems Integration on Aircraft (MISSION) [2] [3], developed under the European Union Clan Sky2 Program, aims to develop and demonstrate an integrated modelling, simulation, design and optimization framework for aircraft systems and subsystems leveraging Model Based System Engineering (MBSE) principles to the aerospace industry.
This paper proposes a MBSE-based modelling framework supporting the whole aerospace product design workflow from requirements definition to system certification. Several advanced analysis were developed within this framework and can be applied at any stage of the design workflow. This framework enables an optimized aircraft systems design quantified against aircraft key performance indicators (KPIs).
As a case study, we demonstrate the capabilities of the proposed framework to support the design of a modular hybrid electric platform and evaluate its impact at aircraft level.

References

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