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PROGRESS IN RAPID METHODS FOR AERODYNAMIC DESIGN

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ABSTRACT

Computational Fluid Dynamics (CFD) tools, methods and workflows are an integral part of modern aerodynamic design and analysis of aerospace systems over a significant range of the flight envelope. Despite the immediate availability of these tools and significant progress since their inception, the full potential of RANS CFD for informing early design stages can still be limited by it's labour and computational demands. Therefore, high-fidelity CFD tools are not deployed at the most critical point in the design process.

Current technological inflexion point for aircraft propulsion and the pressure to reduce time to marker, requires manufactures to rapidly assess new and radical configurations. Therefore, further advances are necessary to enable rapid and accurate aerodynamic analysis, capable of capturing the relavant physical phenomena, for new and unconventional configurations at a cost suitable for conceptual and preliminary design studies. This represents a significant challenge due to the lack of detailed knowledge available and wide design space available to assess the potential of a new vehicle.

This symposium offers a platform for researchers developing fast numerical methods that can be adopted for early design of transonic, fixed wing aircraft, to communicate the latest advancements in the field. Applications of interest include, among others, rapid assessment of unconventional configurations, prediction of flight loads and wave drag assessment. New methodologies for multi-fidelity, reduced-order models, efficient generation of surrogate models including AI, robust fluid-structural coupling, etc., all of which expand the use and/or accuracy of fast aerodynamic predictions tools are of particular interest.