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Editorial

Special Issue "10th EASN International Conference on Innovation in Aviation & Space to the Satisfaction of the European Citizens"

Liberata Guadagno [1], Spiros Pantelakis [2,*] and Andreas Strohmayer [3,*]

[1] Department of Industrial Engineering, University of Salerno, Via Giovanni Paolo II, 132, 84084 Fisciano (SA), Italy; lguadagno@unisa.it
[2] Department of Mechanical Engineering and Aeronautics, University of Patras, Panepistimioupolis Rion, 26500 Patras, Greece
[3] Department of Aircraft Design, Institute of Aircraft Design (IFB), University of Stuttgart, Pfaffenwaldring 31, 70569 Stuttgart, Germany
* Correspondence: pantelak@mech.upatras.gr (S.P.); strohmayer@ifb.uni-stuttgart.de (A.S.)

This Special Issue contains selected papers from works presented at the 10th EASN International Conference on Innovation in Aviation & Space to the Satisfaction of the European Citizens, which was held successfully from the 2nd until the 4th of September, 2020. Due to the COVID pandemic, it was the first time in the history of the EASN Conference series that the event took place in a virtual format. The event included 9 keynote lectures and more than 320 technical presentations distributed in close to 50 sessions. Important also to underline that 48 HORIZON2020 projects have disseminated their latest research results as well as the future trends on the respective technological field at this event. In total, the 10th EASN International Conference was attended by more than 350 participants from 37 countries worldwide.

In the present Special Issue, eleven engaging articles are contained, with more than 300 views each till now, related to aviation research. Vedernikov et al. [1] performed complex parametrical strength investigations of typical wings for regional aircraft, using an advanced four-level algorithm (FLA). The enhanced algorithm used in this work allows for an efficient strength analysis of airframes and is validated with a high-aspect-ration wing designs, also including strut-braced wings. In a systems-engineering approach, Eisenhut et al. [2] established top-level aircraft requirements (TLARs) for a 50-passenger hybrid-electric regional aircraft. Beyond performance requirements, these TLARs also include environmental factors, becoming increasingly important for sustainable aircraft designs. Furthermore, suitable reference missions are presented, as well as figures of merit that allow for an evaluation of different aircraft architectures. In the work of Bergmann et al. [3], a methodology for precise identification of the performance characteristics of a UAV test platform is described, providing an overview of the measuring system, discussing its functionality and showing flight test results. This facilitates the systematic analysis of propeller–wing interaction effects which are of interest to a synergetic aircraft configuration design with distributed propulsion. Blasi et al. [4] describe the control architecture and the control laws of an innovative Modular Iron Bird concept which aims at reproducing flight loads to test mobile aerodynamic control surface actuators for small and medium size aircraft, as well as unmanned aerial vehicles. The effectiveness of the proposed control architecture and control laws is demonstrated in numerical simulations. Pathak et al. [5] present their work on a model validation case for the distribution of the agent of an environmentally friendly fire protection system (EFFP) in the cargo hold of an aircraft. In the low-pressure vessel of the Fraunhofer Flight Test Facility (FTF), the team was able to equip an aircraft demonstrator with an EFFP and to validate refined simulation models for knockdown during different flight phases in this setup. In the work of Przysowa et al. [6],

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the performance and gas emissions produced from two different jet engines are compared for blends of Jet A-1 fuel with different alternative fuels in various concentrations. The acquired data serve the development of an engine emissivity model allowing for the prediction of engine emissions. The results show that under an emissions point of view blended fuels can be used to fuel gas turbines. Seitz et al. [7] present key results for the EU H2020 project CENTRELINE, undertaken to demonstrate a proof of concept for the so-called propulsive fuselage concept (PFC) with boundary layer ingestion (BLI). A performance bookkeeping scheme for the BLI propulsion is reviewed and findings from the high-fidelity aero-numerical simulation and aerodynamic validation testing in wind tunnel and BLI fan rig test campaigns are discussed. An assessment of the PFC fuel burn compared to a conventional design shows a 4.7% mission fuel benefit. Norrefeldt et al. [8] assessed the effects of an alteration of the outdoor/recirculation airflow ratio in an aircraft cabin on relative humidity, CO2 and total volatile organic compounds (TVOC) level in the cabin air. Tests were conducted in the Fraunhofer FTF facility, showing an increase of these parameters with an increased recirculation fraction, as the passenger emissions become less diluted by dry outdoor air. Kellermann et al. [9] investigated the use of ram-air based thermal management systems (TMS) for the cooling of the power train components of future hybrid electric aircraft, assessing the impact on mass, drag and fuel burn. A numerical optimization of respective TMS system was carried out for minimum fuel burn of a 180 passenger short range aircraft with a partial electric propulsion system. For a power split of 30% electric power, an additional fuel burn of 0.19% due to the TMS is reported in this work. Pavlenko et al. [10] analyzed the design requirements and operating parameters of small turbofan engines for single-use and reusable unmanned aerial vehicles (UAVs), in order to introduce alternative materials and technologies for manufacturing their compressor blades. Stress and temperature maps on compressor blades and vanes were obtained by means of thermal and structural analysis, considering the physical and mechanical properties of advanced materials and related processing technologies. It was shown that the permissible operating temperature and safety factor as well as the design requirements of the turbofan at lower manufacturing costs are met with the proposed materials. Finally, Engelmann et al. [11] analyzed the boarding procedure of a single aisle aircraft with an improved simulation methodology, increasing the level of detail in the boarding simulation. The improved model considers, for example, the passenger walking speed in dependence of surrounding objects and the location of other passengers. A validation was carried out with an Airbus A320 as a baseline, compared to an altered version with an extended aisle width and to a COVID-19 safe distance scenario. As a result, a boarding time reduction of up to 3% could be shown for the wider aisle, while the COVID-19 scenario leads to an increase of 67%.

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