Guest editorial: Computational fluid dynamics in aerospace engineering: recent advances

Dear reader,

It is my pleasure to present you with a special issue on *Computational Fluid Dynamics in Aerospace Engineering: Recent Advances in the Aircraft Engineering and Aerospace Technology (AEAT) Journal.*

Computational fluid dynamics has become the key tool in the aviation industry to enhance advanced concepts. The aviation industry is the first industry to use simulation tools heavily. Typically, the CFD were used to design the futuristics design and other novel design concepts. In general, the design of aircraft, launch vehicles, missiles and UAV were immensely dependent on the CFD tools for their accurate prediction of various parameters without an expensive test facility. In general, CFD are used to predict the aerodynamic forces, structural loads, thermal loads, combustion, etc. Implementing the proper tools to the CFD simulations massively reduced the involvement of the experimental testing. The aircraft simulations were carried on in the aircraft with various flow conditions, including steady and unsteady fluid motion to predict the lift, drag, thrust, noise, vibrations, combustion and other subsystem analysis. In addition to the above, boundary layer predictions, turbulence generations and shock waves were also frequently studied. With regard to the complex modelling, the DNS, Reynolds Averaged Navier-Stokes (RANS) and closure problems were applied to understand the behaviour of the fluid motions. RANS is one of the widespread approaches in terms of industries. Further, the large-eddy simulations (LES) were also applied to resolve the structure of flows. To obtain high accuracy in the solutions, the hybrid approaches were used. Hybrid methods are the combination of LES and RANS, which is called detached Eddy simulation (DES). Although the predefined commercial software provides instant solutions to aviation problems, the uncertainty is high. Thereby many pioneers were developing their own coding to solve the problems through algorithms. Developing the coding for a single complex problem is not an easy task; it requires more time than the commercial codes. It is the responsibility of researchers and inventors to develop a reliable tool for the CFD design.

Hence this special issue is devoted to understanding the role of CFD in aviation and other multidisciplinary energy sectors. The mentioned special issue targets the audience from the different areas of the research but is related to the solving of complex problems through numerical simulations and coding. I would like to thank all the authors for their high-quality manuscripts. Furthermore, I would like to extend my thanks and gratitude to all the reviewers for their time in suggesting the comments to improve the quality of the article. Finally, I thank Prof Dr Philip Webb, the Editor-in-Chief of *Aircraft Engineering and Aerospace*, and the editorial staff for their continuous support in preparing the special issue content. Collectively, the guest editors believe that the published papers provide insights on the current challenges in the implementation of the CFD in multidisciplinary, aeronautical and aerospace applications.

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