



Preface

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Aerospace systems require a fusion of concepts and have tight coupling between several disciplines like propulsion, structures, control, aerodynamics etc. They also have to take into account the manufacturability, reliability and maintainability. This special issue is on “Aerospace Systems” being brought out with the main aim of focusing attention on some of the complex issues involved in the design and analysis of systems like aircraft, launch vehicles and spacecraft. There are altogether nine papers in this issue, in which five papers address specifically the areas of propulsion, structures, control and aerodynamics respectively. Aerospace systems are essentially multidisciplinary, highly complex, with several technologies interacting together and therefore preventing each one of them from being handled separately. The field of Multidisciplinary Design Optimization (MDO) provides answers on how to integrate them into the design process, while reducing the design cycles. One paper on MDO specifically brings out these issues. There are two papers which address the technologies and challenges in unmanned aircraft and spacecraft systems.

In any aircraft engine the air intake is an important component. The first paper from Sanjay Mittal discusses various aspects of the air intake, startup problem of the intake, the effect of bleed on the performance etc. The paper from Kotresh Mallikarjun Gaddakeri is on cocured composite structures. It allows curing of multiple parts simultaneously to form an integral structure. This paper discusses the tooling technologies for realising complex

structures of aircraft. Gopal Jee et. al. discuss the challenges faced and the solutions developed for control law design of a typical re-entry vehicle. Since this vehicle is a winged body the control law developed depends on both aircraft and launch vehicle control law design methodologies. The fourth paper from Vinodkumar et.al. is in the area of aerodynamics and discusses the effects of jet(s) on the aerodynamics of a launch vehicle. In this study a series of experiments on suitable configurations with varying geometric parameters and their detailed analysis have been carried out to understand the phenomenon. The paper from Balakrishnan Narayanarao et.al summarizes the utilisation of the HiFUN solver for the high lift wing design and presents the details of computations performed in understanding the predictability of the flow past NASA Trap Wing. Cryogenic propulsion systems used in launch vehicles are quite complex and the paper from Bijukumar et.al. present the development of a mathematical model for a cryogenic engine to predict the engine start and shut off sequences, smooth and safe ignition, and the performance of subsystems under transient-phase, nominal and off-nominal conditions. Last two papers by Pullat Srikumar and Shivakumar present advanced technologies, challenges and opportunities in unmanned aircraft systems and spacecraft systems respectively.

We express our sincere thanks and deep appreciation to all authors who have contributed to this special issue on Aerospace Systems.

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