Special issue on advanced control of aerospace vehicles

The control of aerospace vehicles, such as manned/unmanned airplanes, hypersonic vehicles, satellites, and missiles, has attracted a great amount of interest in recent years owing to the rapid development of potential application areas. Modern aerospace vehicles often employ large, complex, and lightweight structures, which result in these space structures being extremely flexible and having low-frequency fundamental vibration modes. These bring challenges to traditional control and optimization methodologies. There is an urgent need to develop new optimization, control, modelling, decision, and fault diagnosis methods. The last few decades have witnessed tremendous advances in control techniques such as robust $H_2/H_{\infty}$ control, adaptive control, and sliding mode control, which have contributed greatly to the successful handling of certain control problems for complex aerospace systems that until recently were thought too difficult to analyse. However, their capability to handle bounded uncertainties/disturbances and unmodelled dynamics in contemporary flight control systems needs to be strengthened. Meanwhile, newly developed mathematical tools and technologies have also opened up various possibilities for the practical implementation of advanced control algorithms in aerospace vehicles.

The purpose of this special issue is to bring together the latest/innovative achievements on the research of control of aerospace vehicles. Articles submitted to this special issue cover both the practical and theoretical aspects of advanced control and optimization techniques in the broad areas of robust nonlinear control, fault-tolerant control, multi-objective parameter synthesis, information modelling, adaptive backstepping control, and switching control. Twelve articles have been selected after a rigorous peer review process, and they provide solutions, or early promises, to the modelling, analysis, and implementation of control and optimization problems for aerospace vehicles, such as hypersonic vehicles, space launch vehicles, spacecraft autonomous navigation systems, and quadrotor unmanned aerial vehicles.

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