Editorial

Fault detection, diagnosis, and fault tolerant control with flight applications

Research and development of fault detection and diagnosis (FDD) and fault tolerant control (FTC) are mainly motivated by the enhancement of reliability and fault tolerant capability. It is critical for flight control systems (FCS) to take FDD/FTC into account to ensure safe operation. It still remain as a challenging and active research area and with even much wider applications to air and space vehicles such as civil transportation airplanes, unmanned aerial vehicles, reusable launch vehicles, near space vehicles, satellites, etc. By recognizing the importance of advanced diagnosis and fault tolerant control techniques to such practical applications, this special issue is dedicated to demonstrate and present new research results of fault detection and diagnosis (FDD) and fault tolerant control with applications to any of the above-mentioned flight control vehicles.

The objective of this special issue is to focus on new and emerging trends in FDD/FTC with flight applications. Among a large number of manuscripts submitted for consideration of publication at the special issue, 14 peer reviewed papers are selected based on the quality of work, especially on new ideas and approaches, or advances made through problem statements, methodologies with applications to flight control systems. Among these papers presented in this special issue, a wide range of FDD/FTC related topics are covered. The fault detection (FD) problems are addressed in finite frequency domain (Long and Yang) or for a class of discrete-time systems (Liu et al.). From the fault tolerant control perspective, both robust controllers (Li et al.) and adaptive controllers (Yao et al.) are examined. In terms of applications to flight control systems, a wide range of aero and space applications are presented, including spacecraft rendezvous (Li et al.), near space vehicles (Xu et al.), satellite attitude diagnosis and estimation (Gao et al., Zhang et al.), Vertical Takeoff and Landing (VTOL) aircraft (Aouaouda et al.), large civil aircraft (Gong et al.), as well as unmanned aerial vehicles (Zhang et al., Park et al.). In addition, the control strategy for partial loss of control authority (Nayebpanah et al.) and cooperative interception (Zhang et al.) are among new topics in FDD/FTC. We hope the readers will find these papers well readable and useful as much as we do.

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