PREDICTIVE HYBRID REDUNDANCY FOR AIRCRAFT WHEEL BRAKING SYSTEM - A DESIGN STUDY

Supriya Mallick, B. Subba Reddy
VTU Extension Centre - Honeywell
Honeywell Technology Solutions Laboratory
Bangalore-560 103, India
Email : Subbareddy.bandi@honeywell.com

Abstract

Aircraft brake system plays an important role in safe take-off and landing phases of flight. In order to meet safety requirements, regulatory guidelines like ARP 4761 suggest duo duplex architecture for the aircraft Wheel Braking System (WBS). Safe and efficient braking systems for ground-based vehicles in the name of Brake By Wire (BBW) are also becoming very common resulting in significant research activity in the recent past. In order to reduce number of hardware components and to improve reliability further of BBW systems, Kim and team of Korean university came up with introduction of analytical redundancy for measurement of wheel angular velocity sensors. The scheme involves Predictive Hybrid Redundancy (PHR) for fault detection using a double exponential smoothing method. Since, such systems are not readily suitable for aircraft WBS, the present study is an attempt to extend this approach to aircraft WBS with appropriate modifications to integrate with normal mode, standby mode and emergency modes of aircraft WBS. Simulation studies for synthetic sensor signals show possibility of continued operation, with one sensor being operational, in the presence of transient, intermittent and hard over faults.