



Mehran Haghparast

I received my BSc and MSc degrees in Electrical Engineering from Iran University of Science and Technology, Tehran, Iran in 2008 and 2011, respectively. I started to study Ph.D. in control Engineering under supervision of Dr. Mahdi Aliyari in K.N.Toosi university of technology since September of 2015. My research interests are fault detection and isolation system in dynamic systems, Attitude determination and control of satellite.

MSc Thesis Title:

Design and Implementation of Fault Detection, Isolation and Recovery System in Satellite Attitude Control Subsystem

Abstract:

In this thesis, design and implementation of fault detection, isolation and recovery in satellite attitude control subsystem is presented. For this purpose fault detection and isolation system is designed based on state estimators. In the designed adaptive observer, faults in the reaction wheels of the attitude control subsystem is estimated using an adaptive law, which enables us to detect and isolate occurrence of fault in reaction wheels. Stability of designed observer is proved by Lyapunov method. Also for recovery of fault effect, fault compensation in reaction wheels is provided with active compensation method. For this purpose, compensator control signal compensates fault effect. Also when failure of one of three reaction wheels occurs, control and stability of attitude is achieved with reconfiguring attitude control structure, using magnetic torquers instead of the faulty reaction wheel. Also designed algorithms for fault detection, isolation and recovery in actuators of attitude control are implemented in on-board electronics of satellite and effective performance of them are illustrated in hardware in the loop test bed.

Keywords: fault detection; fault isolation; fault recovery; adaptive observer; attitude control subsystem

Supervisor: Dr. Mahdi Aliyari Shoorehdeli

Contact: mhaghparast@ee.kntu.ac.ir

tel: (021)84062-172 mob:09126193066