Abstract

Applying flat systems technique in attitude fault tolerant control of an under-actuated satellite has been investigated in this article. The main purpose of this study is development and implementation of a new idea in order to recovery of satellite stability and its acceptable performance in actuator fault scenarios. Solving the attitude fault tolerant control problem is based on consideration a realistic assumption which can show the ability of FTC system in managing the fault scenarios. Lose of effectiveness of actuators which could be caused in many of fault scenarios, modeled and simulated by multiplicative model. Thanks to provided new idea in this study it will be proven that, a wide range of actuator fault scenarios with different intense of faults could be managed without need to reconfiguring the main controller. Usage of this idea affects in reducing the volume of main controller computations and provides an appropriate base for its robust designing in other to dealing with systematically fault scenarios. Furthermore, the provided active fault tolerant attitude control scheme uses analytical redundancy system which could be considered as analytical observer. The suggested analytical observer by this technique, which belongs to nonlinear observer category, can observe all of the dynamic variables in allowable range of error. Practical implications of
this study belong in this fact which analytical redundancy based on new idea in order to maintaining stability could be a perfect option in different fault scenarios such as systematically uncertainties and sensor faults. Hence this idea could be implemented without need to any physical instrument.

References


Index Terms

Computer Science
Control Systems
Keywords
Flat differential technique; flatness based attitude control; nonlinear systems