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Author: Mr. Peizhao Sun
Beihang University (BUAA), China

Dr. Xinsheng Wang
Beihang University, China

FAULTY DIAGNOSIS FOR LM-1 MICROSATELLITE ATTITUDE CONTROL SYSTEM

Abstract

Satellites operate in the environment of extreme temperature and strong electromagnetic radiation in space for a long time, and various faults often occur, which threaten the secure of in-orbit operation and affect the service life of satellites. It is significant to study satellite faulty diagnosis technology. As the basis of faulty diagnosis, faulty modeling is directly related to the reliability and accuracy of faulty diagnosis. Fusion diagnosis algorithm can integrate the advantages of various modeling methods, make up for their shortcomings, and effectively overcome the limitations of a single modeling method. Aiming at difficulties existing in the traditional quantitative models faulty diagnosis methods, this paper introduces a faulty diagnosis method based on multi-analytic models, which integrates the traditional quantitative models method and system structure information, extends the research object of the traditional method based on analytical models from single system to multi-system, and can be applied to the faulty diagnosis problem of complex system containing multiple subsystems. It can not only fulfill the effective faulty location of the actuator and sensor in the system, but also reduce the number of analytical models involved in the calculation. However, the traditional quantitative model method has some limitations in determining the specific faulty type of the faulty component. In addition, the increasing development of artificial intelligence technology makes a number of new technologies have application prospects, among which the more active research is the method of neural network. By analyzing the requirements of satellites faulty diagnosis and the shortcomings of existing methods, a qualitative and quantitative fusion faulty modeling method based on quantitative model and neural network is presented. The theoretical basis, technical method and faulty diagnosis process are given, and the validity of the faulty fusion diagnosis method is verified by using the faulty simulation data from flywheel components of LM-1 attitude control system. The results show that the fusion diagnosis method can effectively make up for the shortcomings of the single diagnosis model, overcome its limitations, and has a good faulty recognition effect.