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INTELLIGENT FAULT MONITORRING AND EARLY WARNING TECHNOLOGY OF SPACE STATION THERMAL CONTROL SYSTEM BASED ON DEEP LEARNING NETWORK FUSION

Abstract

In order to maintain the controlled flow of air and heat to achieve thermal control management, the thermal control system of the space station is very important for the safe and stable operation of the space station. Once the thermal control system fails and fails to deal with it in a timely and effective manner, it will lead to the catastrophic consequences of the equipment being unable to operate and the safety of astronauts is critical, and it is necessary to effectively predict its failure in order to find hidden dangers as soon as possible and take effective countermeasures. The evolution process of some key equipment of the thermal control system from normal to abnormal to final failure can be reflected by some characteristic parameters. With the improvement of sensor technology and the enhancement of simulation technology, a large number of fault test data of the space station thermal control system have been obtained, and the current health status of the components can be identified by analyzing the fault degradation trend in advance, so as to realize the early warning of related faults. In this paper, an intelligent fault monitoring and early warning method for space station thermal control system based on deep learning network fusion(DLNF) is proposed, which uses deep learning method to build and train the degradation model, and combines multi-neural network fusion technology to identify fault types. The effectiveness of the monitoring and early warning method is verified by using the typical slow-change failure data obtained based on the ground test data of the thermal control system of China space station, and the results show that this method can effectively monitor and warn of typical slow-change failures of the space station thermal control system, and has a high accuracy, so that the problems can be found and dealt with in the early stage when the fault is about to occur, and the safety of the operation and use of the space station can be improved.