Research on testability modeling and health monitoring of aircrafts

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Abstract

This paper analyzes the issue of health monitoring of aircrafts, due to a full consideration of the demands for long-term operations. Usually, the monitoring strategies can be constructed in different ways, such as the model-based, the data-driven, the rule-guided, etc. Whether or not to achieve real-time performances will be of great significance.

With the increasing complexity of modern aircrafts, an online monitoring technique, which is based on testability modeling, has proved the advantages and become widely accepted. The health monitoring method will make full use of the information of testability design, optimize and re-allocate testing points relative to possible faults. That will greatly improve the health coverage rate at the aircraft design stage, and also with the possibility of health exceptions detection. What's more, the testability models are relatively standardized and unified, which will help to improve the versatility of health monitoring activities. Currently, one of the most widely marketed analyzing toolkits is TEAMS-RT, which provides the reasoning core based on testability modeling of the multi-signal flow graph.

This paper is intended to investigate a generally technique of online health monitoring based on the testability models of aircrafts. A high-performance real-time algorithm is provided in the paper. A software/hardware prototype is developed with the embedded VxWorks platform. The experimental results prove the effectiveness.

Keywords: Testability model, Health monitoring, Online reasoning, TEAMS-RT, VxWorks.