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ANOMALY DETECTION CONFIGURED AS A COMBINATION OF STATE OBSERVER AND MAHALANOBIS-TAGUCHI METHOD FOR FAULT DETECTION, ISOLATION AND RECONFIGURATION

**Abstract**

Institute of Space and Astronautical Science (ISAS) and IHI corporation have been researching FDIR (Fault Detection, Isolation and Reconfiguration) technologies as a part of an integrated study of Advanced Reusable Rocket Vehicles. Real time anomaly detecting function is recognized as one of the most important elements to realize such a vehicle. Currently, bottom-up type anomaly detecting logic structured based on FMEA is usually used for this purpose, but it requires large amount of time and labor. To improve this process, ISAS and IHI designed a cutting-edge method for anomaly detection which is configured as a combination of state observer and MT (Mahalanobis-Taguchi) method. This method, which can generate a unit space with a small number of normal operation data, will minimize the development efforts. In 2012, we performed an engine hot firing test with simulated anomaly conditions. The obtained data was processed with the new method mentioned above, and the simulated anomaly was detected as expected. In 2013 test campaign, we had this system on-board and demonstrate its real time performance. This paper describes the research history and outline of the system and method which we are currently pursuing.