

A modular fault diagnosis and prognosis method for hydro-control valve system based on redundancy in multisensor data information

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© 2018 IEEE. Fault diagnosis and prognosis (FDP) are important capabilities that can enable autonomous detection and prediction of failures' progress in complex engineering systems. This paper introduces an innovative modular FDP method for a hydro-control valve system. The hydro-control valve is a critical part of the space launch vehicle propulsion system, and health monitoring of this hydro-valve is essential to ensure safety and reliability of the spacecraft. In this study, three main failures, i.e., piston leakage, drain blockage, and filter malfunction, in the hydro-control valve system are considered for monitoring and prognosis. The proposed FDP system has three main components including fault detection and diagnosis (FDD) unit, failure parameter estimation unit, and remaining useful life (RUL) estimation unit. A feature selection strategy and a support vector machine technique are together utilized to capture redundancy in multisensor data information and to isolate failures i