

Does PHM Make an Engineered System Resilient under Sensor Faults?

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ABSTRACT

The use of Prognostics and Health Management (PHM) technology enables engineered systems resilient under adverse events. Adverse events include unexpected system failures, anomaly operation, manufacturing defects, etc. As engineered systems become more complex, resilience thus becomes an emerging engineering feature, which offers an attractive ability to resist and recover from adverse events. However, most resilience studies were conducted under the assumption of no false alarms. This study thus concerns how engineering resilience can be formulated while taking into account false alarm due to sensor faults. Sensor faults can be interpreted in various manners: sensor breakdown, calibration change, sensor noise, etc. This study proposes a new formulation of engineering resilience measure considering sensor faults. Sensor faults can be implemented by changing a sensor gain. The effectiveness of the proposed resilience measure is demonstrated by implementing the PHM into the electro-hydrostatic actuator (EHA) and assessing the resilience under sensor faults. This study is also conducted to see how the proposed resilience measure behaves in the course of the sensor degradation.