Research proposal on fault detection and diagnosis of hydraulic systems

Law, Security

Hydraulic engineering equipment is popular due to the enormous amount of high density power generated and transferred through small pipes and valves and the instant results attained on application of massive forces of torque. Hydraulic systems are usually very complex and, detection and diagnosis of faults should be very precise, however this could hamper the overall functioning of that particular system. Causes of faults within a hydraulic system may range from leaking valves or cylinder seal, blocked filters, to more massive faults such as complete failure of the whole hydraulic system, which often leads to considerable losses in performance and increase in operational costs.

Hence, there is need for diagnostic information, which is a manual for fault diagnosis or as part of a wider architecture for system monitoring and control, which is key in detection of faults. The task of the diagnostic system is to apply data from one or more sensors to establish information regarding the fault condition of the system. Condition monitoring of hydraulic systems is equally essential in the early detection of component failure which could lead to better performance. Operational safety will be enhanced through control design process so as to enable continued safely and effective functioning until it can be shut down and the faulty components repaired (Staroswiecki, 2004).

Against this background, this research is going to focus on two fundamental areas of fault detection and diagnosis in hydraulic systems: 1) efficient line fault detection techniques development by using a model-based approach and the smooth variable structure filter (SVSF). 2) Adaptive control strategy

development that uses fault diagnosis information in ensuring safety and reliable performance of the system in the presence of performance impairing faults, using the multiple sliding mode control (MSMC).

Reference

Staroswiecki, M. (Eds.). (2004). *Proceedings from 5th IFAC symposium 2003: Fault detection, supervision and safety of technical processes 2003* . Washington, D. C: Elsevier.