Fault Tolerant Control of the Dynamical Systems Based on Internal Structure Systems

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Abstract : The problem of fault-tolerant control (FTC) by accommodation method has been studied in this paper. The fault occurs in any system components such as actuators, sensors or internal structure of the system and leads to loss of performance and instability of the system. When a fault occurs, the purpose of the fault-tolerant control is designate strategy that can keep the control loop stable and system performance as much as possible perform it without shutting down the system. Here, the section of fault detection and isolation (FDI) system has been evaluated with regard to actuator's fault. Designing a fault detection and isolation system for a multi input-multi output (MIMO) is done by an unknown input observer, so the system is divided to several subsystems as the effect of other inputs such as disturbing given system state equations. In this observer design method, the effect of these disturbances will weaken and the only fault is detected on specific input. The results of this approach simulation can confirm the ability of the fault detection and isolation system design. After fault detection and isolation, it is necessary to redesign controller based on a suitable modification. In this regard after the use of unknown input observer theory and obtain residual signal and evaluate it, PID controller parameters redesigned for iterative. Stability of the closed loop system has proved in the presence of this method. Also, In order to soften the volatility caused by Annie variations of the PID controller parameters, modifying Sigma as a way acceptable solution used. Finally, the simulation results of three tank popular example confirm the accuracy of performance.

Keywords : fault tolerant control, fault detection and isolation, actuator fault, unknown input observer

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