论文与报告

基于故障诊断观测器的输出反馈容错控制设计

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摘要
针对自适应故障诊断观测器需要误差系统满足苛刻的严格正实条件(Strictly positive real, SPR)和难于处理输出存在扰动的不确定性系统等问题, 提出了一种新型的增广故障诊断观测器的设计方法, 不仅显著地拓宽了自适应故障诊断观测器的适用范围, 而且其具有处理系统扰动的良好性能. 在故障估计的基础上, 提出了动态输出反馈容错控制的设计方法, 避免了基于观测器的状态反馈容错控制的设计难点. 同时, 故障诊断观测器和输出反馈容错控制是分开设计的, 并且又考虑了各自的性能, 简化了设计过程. 最后, 通过仿真实验验证了所提方法的有效性.

关键词　　故障诊断　　容错控制　　自适应观测器　　输出反馈控制　　线性矩阵不等式

分类号

Fault Diagnosis Observer-based Output Feedback Fault Tolerant Control Design

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Abstract
For adaptive fault diagnosis observer design, the error dynamics is needed to satisfy the strictly positive real (SPR) condition, and uncertain systems containing output disturbances cannot been dealt with well. So a novel augmented fault diagnosis observer design is proposed not only to broaden application scopes of adaptive fault diagnosis observer evidently, but also to cope with system disturbances well. Then, based on the obtained fault information, a dynamical output feedback fault tolerant control design is proposed to avoid design difficulties caused by observer-based state feedback fault tolerant control. Meanwhile, the fault diagnosis observer and output feedback fault tolerant controller are designed separately and their performances are considered simultaneously to simplify design procedures. Finally, simulation results are presented to show the effectiveness of the proposed method.

Key words　　Fault diagnosis　　fault tolerant control　　adaptive observer　　output feedback control　　linear matrix inequality (LMI)

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