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短文

基于微分对策的最优状态观测器和最优状态反馈控制器的设计

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摘要
研究了线性系统基于二次型指标的最优状态观测器和最优状态反馈控制器的设计问题．将观测状态的状态反馈和状态误差的输出反馈分别作为两个对局方,应用微分对策理论研究了系统的最优控制问题．给出了最优状态观测器和基于状态观测器的最优状态反馈控制的存在性条件．将系统的最优状态观测器和最优控制器的设计问题转化为一对Riccati方程的求解问题．研究表明最优状态观测器在一般情况下不存在．并进一步研究了基于状态观测器的次优控制问题,给出了基于LMI的优化算法．

关键词 观测器 最优控制 微分对策 Riccati方程

分类号

Design of Optimal Observer and Optimal Feedback Controller Based on Differential Game Theory

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Abstract
This paper deals with the problem of designing optimal state observers and optimal state feedback controllers for linear systems based on quadratic performance index. The theory of differential game is used to study the problem by assuming ‘state feedback of observer state’ as the first player and ‘output feedback of state error’ as the second player. The existence conditions for optimal observer and feedback controller are given and the solutions can be obtained by solving two algebraic Riccati equations. It is shown that the optimal state observer does not exist in general. Furthermore, the problem of designing suboptimal state feedback controllers based on state observers is studied and sufficient conditions are given in the forms of LMIs.

Key words Observer optimal control differential game riccati equation

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