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论文与报告

基于动态补偿的矩形广义系统线性二次最优控制

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摘要
考虑了基于动态补偿的矩形广义系统线性二次最优控制问题. 首先给出具有适当动态阶的补偿器,使得闭环系统正则、稳定、无脉冲(称为容许), 而且相关的矩阵不等式和Lyapunov方程解存在. 进一步二次性能指标可写成一个与该解和系统初值相关的表达式. 为了求解系统的最优控制问题, 将该Lyapunov方程转化为一个双线性矩阵不等式, 并给出了相应的路径跟踪算法以最小化二次性能指标, 进而得到最优补偿器. 最后, 通过数值算例说明本文方法的有效性和可行性.

关键词 矩形广义系统 动态补偿器 最优控制 路径跟踪算法 双线性矩阵不等式
分类号

Linear Quadratic Optimal Control Based on Dynamic Compensation for Rectangular Descriptor Systems

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Abstract
The linear-quadratic optimal control by dynamic compensation for rectangular descriptor system is considered in this paper. First, a dynamic compensator with a proper dynamic order is given such that the closed-loop system is regular, impulse-free, and stable (it is called admissible), and its associated matrix inequality and Lyapunov equation have a solution. Also, the quadratic performance index is expressed in a simple form related to the solution and the initial value of the closed-loop system. In order to solve the optimal control problem for the system, the proposed Lyapunov equation is transformed into a bilinear matrix inequality (BMI), and a corresponding path-following algorithm to minimize the quadratic performance index is proposed in which an optimal dynamic compensator can be obtained. Finally, a numerical example is provided to demonstrate the effectiveness and feasibility of the proposed approach.

Key words Rectangular descriptor system dynamic compensator optimal control path-following algorithm bilinear matrix inequality (BMI)

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