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结构控制设计中具有输出反馈最小范数的极点配置方法

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POLE ASSIGNMENT METHOD OF OUTPUT FEEDBACK WITH MINIMIZED NORM IN VIBRATION CONTROL SYSTEM DESIGN

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摘要

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摘要 给出了结构控制系统输出反馈极点配置的设计方法,该方法采用鲁棒性分析设计的一些基本步骤,兼顾结构控制系统的鲁棒性和计算的简便。基于鲁棒度量建立状态向量和输出向量参数之间的协调关系,利用 QR分解技术,导出鲁棒极点配置问题的增益矩阵表达式,通过分析该表达式,可以得出本文方法的鲁棒性能够得到保证。将输出反馈极点配置问题转化为非线性最小二乘问题,用 LM方法解出具有最小范数的反馈矩阵。最后将本文方法应用一个 3层结构在正弦载荷作用下的振动控制问题,证实了本文方法的性能

关键词: 结构振动 主动控制 极点配置 输出反馈

Abstract: A pole assignment method of output feedback with minimized norm in vibration control system design is developed. This method utilizes some steps of robust pole assignment control design so that both robustness of the structural control system and convenience and simplification of calculation are considered. The parameter compatible relation between state vector and output vector based on the measure of robustness is established. By the QR decomposition of matrices, the gain matrix expression can be derived from the mathematics description of the robust pole assignment problem. After analyzing the gain matrix expression, one can obtain the conclusion that robustness of the present control method is guaranteed. The output feedback pole assignment problem is transformed to a least square problem. The feedback matrix can be obtained by using LM algorithm. Finally, this method and its application to the control of a three story structure under a deterministic sine load are shown. The performance of the pole assignment method in this paper is demonstrated.

Keywords: structural vibration active control pole assignment method output feedback

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