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短文

基于分段模糊Lyapunov方法的离散模糊系统分析与设计

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摘要
研究了基于分段模糊Lyapunov函数的离散T-S模糊控制系统稳定性分析及控制器设计问题. 首先,在定义离散型分段模糊Lyapunov函数的基础上,提出了一个新的判定开环离散T-S模糊系统稳定性的充分条件. 该条件仅需在每个最大交叠规则组内分别满足模糊Lyapunov方法中的条件,从而降低了公共Lyapunov方法和模糊Lyapunov方法的保守性和难度. 然后,利用并行分布补偿方法对闭环系统的稳定性进行了分析并设计了模糊控制器. 最后,一个仿真示例说明了本文方法的有效性和优越性.

关键词 稳定性分析 T-S模糊系统 分段模糊Lyapunov函数

分类号

Analysis and Design of Discrete Fuzzy System Based on Piecewise Fuzzy Lyapunov Approach

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Abstract
Stability analysis and controller design of discrete T-S fuzzy control systems are studied based on piecewise fuzzy Lyapunov approach. Firstly, a new sufficient condition to check the stability of open-loop discrete T-S fuzzy systems is proposed after the definition of a discrete piecewise fuzzy Lyapunov function. This condition only needs to satisfy the condition of the fuzzy Lyapunov approach in each maximal overlapped-rule group. Therefore, the proposed condition is less conservative and less difficult than the common Lyapunov approach and the fuzzy Lyapunov approach. Then, by using the method of parallel distributed compensation, the stability of the closed-loop discrete T-S fuzzy system is analyzed and the fuzzy controller is designed. Finally, a simulation example shows the approach is effective and advantageous.

Key words Stability analysis T-S fuzzy system piecewise fuzzy Lyapunov function

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