自动化学报 (): ISSN: 0254-4156 CN: 11-2109/TP

[2007-1032]输入采用一般模糊划分的T-S模糊控制系统稳定性分析

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收稿日期 修回日期 网络版发布日期 2008-2-1 接受日期

摘要
通过定义一种对输入空间的一般模糊划分(GFP), 研究了输入采用GFP的T-S模糊系统的性质, 以充分利用规则前件变量的结构信息. 通过构造连续分段光滑Lyapunov函数, 提出了新的T-S模糊控制系统的稳定性条件. 该条件同时考虑了各局部子系统之间的相互关系, 降低了现有稳定性条件的保守性和求解难度. 通过严格证明和数值示例, 比较了所得稳定性条件之间的保守性关系及其与以往充分条件之间的关系. 对运用并行分布补偿(PDC)和线性矩阵不等式(LMI)方法所设计的T-S模糊控制系统进行计算机仿真研究, 结果验证了所得稳定性条件的有效性和优越性.

关键词 模糊控制,T-S模糊模型,稳定性,一般模糊划分(GFP)
分类号

Stability Analysis of T-S Fuzzy Control System with Inputs Using General Fuzzy Partition

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Abstract
With the proposed definition of the general fuzzy partition (GFP) in the input space, the properties of T-S fuzzy control systems using GFP inputs are studied to make the best of the antecedent structural information. New stability conditions of T-S fuzzy control systems are proposed via constructing the continuous piecewise smooth Lyapunov function. The resulting conditions in which the interactions among local subsystems are also considered would relax the conservatism of the previous ones and reduce the difficulty of solution. The conservatism relationships among the new conditions we proposed, as well as the relationships between the new conditions and the former one are proved in the rigorous and numerical manners. Using the parallel distributed compensation (PDC) and linear matrix inequalities (LMI) approach, the resulting T-S fuzzy control systems are investigated by computer simulations. The results demonstrate that the new stability conditions are effective and advantageous.

Key words Fuzzy control T-S fuzzy model stability general fuzzy partition (GFP)
DOI:

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