论文

基于混合逻辑的非线性系统多模型预测控制

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摘要
针对已有的多模型预测控制算法在模型预测过程中采用局部线性模型进行预测而产生的预测误差较大这一问题, 本文将非线性过程的多模型描述与输出预测之间的因果关系以约束条件的形式引入到模型预测控制的设计中, 将非线性过程描述成为一个混合逻辑动态系统模型, 模型切换规则以先验知识的形式引入到多模型预测过程中, 该模型可以全局地表征非线性过程的特性, 从而解决了多模型约束非线性预测控制的模型预测与模型切换问题.

关键词　非线性预测控制　多模型　混合逻辑　混合整数二次规划(MIQP)

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Multi-Model Predictive Control for Nonlinear Systems Based on Mixed Logic

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Abstract
Big prediction errors are brought into being as the local linear model is used to predict the future output in the model prediction process for the existent multi-model predictive control algorithms. To solve this problem, this paper introduces causality relationship between multi-model of nonlinear process and output prediction into model predictive control framework in the term of constraint conditions, so that the nonlinear process can be described by a mixed-logic dynamic model. This paper also introduces switch rules into the multi-model predictive controller as a kind of preexperiential knowledge. This new mixed logic dynamic model can characterize the nonlinear process entirely, thus solving the problem of model prediction and model switch for multi-model constrained nonlinear predictive control.

Key words　Nonlinear predictive control　multiple models　mixed logic　mixed integer quadratic program

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