

研发、设计、测试

基于GA-Vague集自适应PID控制器设计

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收稿日期 2007-11-27 修回日期 2008-2-27 网络版发布日期 2008-10-8 接受日期

摘要 提出了一种基于GA-Vague集相似度量推理的自适应PID控制器的设计方法。该控制器由三部分组成: (1) 遗传算法对模糊推理规则的优化; (2) Vague集推理规则表精确量的计算; (3) 基于Vague集相似度量的自适应PID设计。该控制器弥补了模糊PID控制器的不足, 模糊变量隶属值难以确定, 描述信息单一, 又充分发挥了遗传算法的寻优能力, 对推理规则表优化, 得到最佳组合的PID控制, 以确保系统的响应具有最优的动态和稳态性能。仿真结果表明, 控制器具有响应速度快, 稳态精度高等特点, 可用于控制不同的对象和过程。

关键词 [遗传算法](#) [模糊集相似度量推理](#) [优化](#) [自适应PID](#)

分类号

Design of self-adaptive PID controller based on GA-vague sets

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Abstract

A self-adaptive PID controller based on genetic algorithm and vague sets using measures of similarity reasoning is presented. It consists of three parts: (1) fuzzy inference rules are optimized by the genetic algorithm; (2) the calculation method of precise values of vague sets reasoning rules; (3) the design of a self-adaptive PID controller based on vague sets using measures of similarity reasoning. This controller not only makes up the defaults of fuzzy-PID controller that membership values are difficult to determine and that information is single, but also makes good use of optimization of genetic algorithm. So it can get the best combination of PID control to insure the optimal dynamic and steady response. The simulation results show that the controller has a fast response speed and high steady precision. It can be used in different objects and processes.

Key words [genetic algorithm](#) [measures of similarity reasoning using vague sets](#) [optimize](#) [self-adaptive PID](#)

DOI: 10.3778/j.issn.1002-8331.2008.29.027

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