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短文

PI控制下开环不稳定对象可行稳定裕度范围的研究

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摘要

针对一阶不稳定加延迟对象, 基于传统稳定裕度定义的PI控制整定方法缺乏对幅值裕度下边界的考虑, 使得结果与实际有一定偏差. 通过对延迟环节的逼近, 得到更精细的可达稳定裕度区域. 利用多项式方程数值求解算法, 同时获得了另一种以幅值裕度下边界为基准的控制参数整定方法. 所得结果显示, 按照严格稳定裕度定义所得到的可达区域明显减小. 数值实例验证了本文方法的有效性.

关键词 稳定裕度 PI控制 PM法 整定规则

分类号

Feasible Stability Margin Region for Unstable Process with PI Control

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Abstract

For an unstable-first-order-plus-dead-time plant, the PI tuning formulae based on the conventional stability margin specifications can obtain the feasible stability margin region, however, only the increasing gain margin has been considered. The decreasing gain margin is obtained by Pade approximation of the delay in the framework of the previous tuning rules. The numerical polynomial solving approach is employed to seek the feasible stability margin region. At the same time, a novel tuning rule based on the decreasing gain margin is proposed. The results demonstrate that the feasible region is a small portion of the original one. Finally, some numerical examples are presented to validate the results.

Key words Stability margin PI control PM method tuning rule

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