

短文

自适应鲁棒最优PI控制器

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摘要

提出一种具有鲁棒性能的自适应最优PI控制器, 它首先基于控制回路在正常运行操作中产生的过程输入和输出信号, 通过信号分解和频域分析在线辨识出过程对象在重要频率点的频率特性, 然后计算出可同时满足鲁棒性能指标 λ 和最小负载扰动特性的最优PI控制器参数, 同时控制性能可以很方便地根据实际需要通过对鲁棒性能指标 λ 来调节. PI控制器的自适应过程不需要过程对象和控制器的任何先验知识, 也不需要中断控制回路的正常运行, 仿真实验表明了自适应控制器的有效性和可行性.

关键词 [自适应控制](#) [频率特性](#) [鲁棒性](#) [PI控制器](#)

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Adaptive and Optimal PI Controller with Robustness

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Abstract

This paper presents a new technique of adaptive and optimal PI controller with robustness. On the basis of process input and output data of normal operation in the control loop, important frequency responses of process are estimated by signal decomposition and analysis in frequency domain. Then, PI control parameters are calculated to satisfy both the robustness specification λ and optimization of load disturbance rejection. The control performance can be easily regulated to meet the practical requirements by changing robustness specification λ . The adaptive procedure of PI controller does not need any prior knowledge of the process and previous controller while the control loop is still in the normal operation. Simulation example is given to show both effectiveness and feasibility of the adaptive PI controller.

Key words [Adaptive control](#) [frequency response](#) [robustness](#) [PI controller](#)

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