



The simulation research of an adaptive fuzzy PID controller in heating systems control

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Abstract

In view of uncertainty, nonlinear and other factors of the heating system heat load, on the basis of theoretical analysis, according to the empirical data, the control system automatically products fuzzy control rule, adjusts the PID controller parameter, designs control coefficient, and tunes PID controller parameters K_P , K_I , K_D scope of the domain on-line, thus improve control accuracy, overshoot is significantly reduced to, achieve superior to conventional PID control.

Key words: Fuzzy PID controller, Heating system, Simulation

1. Introduction

In the control of thermal load with the load of the object changes or the impact of interference, its target parameters change, adaptive control with modern control theory reproduction identify characteristic parameters. By timely change control strategy, The control system is straight at the best (Geng, 2007). In view of heating system Uncertainty, Nonlinear, we design the control system based on the theoretical analysis and the empirical data automatically generate fuzzy control rules, adjust PID controller parameters, and design control coefficient, tuning PID controller parameters K_P , K_I , K_D scope of the domain on-line. Thus improve control accuracy, overshoot is significantly reduced to, achieve superior to conventional PID control.

2. Conventional PID controller in the matlab simulation

PID controller is the first development of the control strategy, because this controller has a simple control structure, adjusts easily in the practical, it is used widely in the industrial control. The traditional PID control method is based on a mathematical model of the object and the control system requirements to design controller, and describes control rule with mathematical analysis, this control method has explicit characteristics. In the actual engineering controls, because of the complexity of the external environment and the uncertainty of the control object, accurate mathematical description of the object model is unable to be given. The traditional solution is to obtain the step response of object through experiment,