

## Abstract

Genetic Algorithms (GA) is a kind of random search algorithms, which is inspired by the mechanism of natural selection. GA performs particularly well in solving the problems of high complexity and nonlinearity and has been used successfully in many fields. Especially in the field of control, which is related inherently with the optimization theory, GA is being used in the design of almost all kinds of control systems.

At the same time, along with the wider use of control systems and higher complexity of the plants, we are facing the great challenge of more and more complicated control problem. And the uncertainty is one of the most important factors of the complexity of control, people are trying to settle it. The situation has been promoting the development of robust control greatly.

In this thesis, we mainly study the basic methods for robust controller design based on GA. First, the basic concepts of GA and robust control are introduced shortly; then, the GA based robust PID controller design method and how to solve it step by step are presented, and the effectiveness of such a design method is illustrated by a simple simulation experiment. In the end, the controller is used in an electrical oven temperature control system, and its performance is satisfied.

**Key words:** Genetic Algorithms, robustness, PID control, parameters setting