

Computer-Aided Design of the Fuzzy Control System Using the Genetic Algorithm

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This paper presents the computer-aided design procedure of the automatic control system (ACS) on the basis of fuzzy logic. The genetic algorithm based approach to design of the fuzzy control system on the chosen quality criterion is considered. The mathematical model of the fuzzy logic based pulse control system is suggested, that is developed with MATLAB/ Simulink/ Fuzzy Logic Toolbox. The results of the synthesis of the fuzzy logic based control systems derived using MATLAB / Global Optimization Toolbox are given. As a result two approaches to the fuzzy controller synthesis have been considered: (1) with adjustable membership functions, (2) with membership functions fixed by an expert and with adjustment of input and output scale factors. It is shown that the second approach is preferable to the first, because it is simpler to implement and reduces the time required for setting the controller parameters.