ABSTRACT

Fuzzy logic controller is modern control method which easy to use because it does not need to find a mathematical model of a system, but still effective because it has a stable system response, redundant or fault tolerant, which means fuzzy logic controller can still work despite the reduction of some rules, or case of small errors in programming, without any significant change.

This system use a thermoelectric cooling module and controlled by a microcontroller ATmega 32 and it use fuzzy logic as a controlling method . Fuzzy logic is designed has two inputs and one output. Each input and output membership function have three to five and it use Sugeno rules method that consists of fuzzy if-then rule. Push buttons are used for input set point and then the output voltage is converted to digital scale by ADC of microcontroller, where user enter data that will be processed such as a volume and water conditions are desired.

From the fuzzy testing by trial and error in the system was concluded if it has observed in time response the fourth is the best with the smallest error value is 2.83%, where a cooling process takes 20 minutes 34 seconds. So by using fuzzy logic, the efficiency of this cooling system is 48.75%. Meanwhile, if observed in stability segment, the fifth fuzzy has a best stability with a maximum error of 1.43%, but in the segment energy used, the system using third fuzzy requires more energy about 10,88% larger than control system today.

Keywords: thermoelectric, Fuzzy Logic, Sugeno method, temperature, PWM