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Comparison of Fuzzy Control and PID Control

M. Suganya[1], K. Jayanthi[2]

[1]Assistant Professor, St. Joseph's College for Women, Tirupur, Tamil Nadu, India

[2] St. Joseph's College for Women, Tirupur, Tamil Nadu, India

ABSTRACT

As it knows most of the quotidian types of control, problems are not simply to evaluate and considerate formal modelling based in traditional techniques. The process control makes the evaluation and executions more efficient in the industry. This article was made with the purpose to compare two types of control, one with FUZZY logic and second one PID control. Here we have developed temperature control system using fuzzy logic. The flyback converter with voltage doubler rectifier acts as an output module. To overcome the efficiency degradation during lightload due to load dependent soft switching of the ZVS, a control method using pulse width modulation (PWM)proportional to the load current is us Comparison between Fuzzy logic controller & PID controller based on pulse width modulation is proposed and the results are analysed. Thus, comparing the result PID controller gives more accurate results than first Fuzzy logic controller.

Keywords : FUZZY logic, PID control, ZVS, Pulse Width Modulation (PWM), Membership Function, Defuzzication, Fuzzication

I. INTRODUCTION

This fuzzy logic was investigated in 1965 by Lotfy A. Zadeh. Engineer, in the Berkeley University (California). Associate a fuzzy set with a linguistic term is the easy way to understand the system behaviour. In the beginning, this kind of control the scientist population did not accept it but when Zadeh published more of his theories there was another scientist who contributed to the development of this theory. The Zadeh's goal was create an easier method to manipulate the imprecision the best way possible and associate with the human vague thought and their linguistic expressions. The PID control is the most conventional tool for control process; today the PID control is find it in all areas, and the design come in many different forms.

The PID control is important for the distributed control system. The structure of a PID controller is as simple as it's its weak point, that's because its range of control is limited. The goal of this project is comparing what the fuzzy control can do against a PID, which it is a classical control. The comparisons are made with: error, stability, overshoot and response time.

As a desirable solution to the above-mentioned drawbacks this paper proposes DC-DC converts using active clamp technique and pulse width modulation control. It integrates a bidirectional boost convert with a series output module as a parallel input series output (PISO) configuration.

This connection makes the bidirectional boost converter as up active clamp circuit. Therefore, it uses the step-up capability of the stacked output capacitors while maintaining the soft switching capability of the active clamp circuit.

However, the proposed has a load-dependent ZVS condition, which is an inherit characteristic of the active clamp circuit. It causes hard switching at a light load and degrades conversion efficiency. To recover ZVS at a load, a control method using Pulse Width Modulation (PWM) is also proposed.

II. METHODS AND MATERIAL

Outcome of temperature control using fuzzy Control

Fig 2.1 : Overall View of System

The Temperature in the case study is as follow:

Set temperature: 45˙ C

Current temperature: 46˙ C

Fig 2.2: LCD display

Error = SP – CV = 45 - 46 = -1

Rule base Follow: Rule-2(SNEG) and Rule-3(ZERO)

Therefore Fuzzilization value f2=0.04

f3=0.933

Defuzzilization value Z˙ = 130.95

The Duty Cycle of HEATING COIL current = 49%

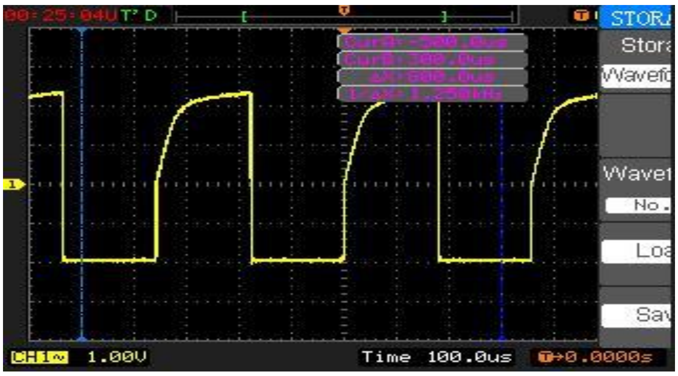

Fig 2.3 : Graph of PWM

III. SIMULATION RESULTS FOR PID CONTROL

The input given is 12 V which is shown in fig3.1.

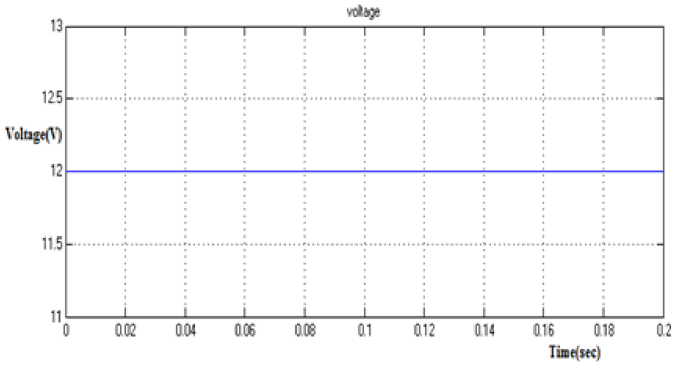

Fig 3.1. Input voltage waveform

For 10 ohm load the output voltage is 86.5 V and the output current is 8.65 A. The output voltage and current waveforms are shown fig 3.2.

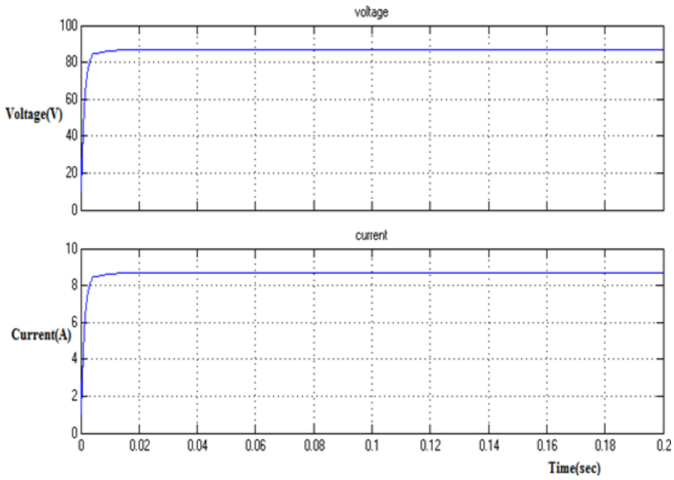

Fig 3.2. Output waveform

Thus, even at the light load condition the output voltage is stepped up appropriately without any distortions or losses.

IV. CONCLUSION

In this dissertation fuzzy temperature controller is defined and implemented in microcontroller without using any special software tool. Unlike some fuzzy controllers with hundreds or even thousands of rules running on computer systems. A unique FLC using a small number of rules and simple implementation is demonstrated to solve a temperature control problem with unknown dynamics or variable.

Fuzzy logic provides a completely different way to approach a control problem. This technology is not difficult to apply and the results are usually quite interesting. Thus, Fuzzy logic is one of the most interesting approach to control the temp in microcontrollers.

In this thesis we have shown the control behaviour of many fuzzy control system including temperature plant. Then we tabulated the final results of the above-mentioned various control system.

Non isolated high step up DC-DC converter with pulse width modulation technique is presented in this paper. The voltage doubler rectifier is used to step up the voltage. This simple and effective techniques give many desirable features for high efficiency and high step up applications.

The proposed converter topology and control techniques can be a promising solution for high step-up applications.

Here we have compared the result obtained by both PID (PROPORTIONAL INTEGRAL DERIVATIVE) and Fuzzy logic control. Thus PID (PROPORTIONAL INTEGRAL DERIVATIVE) control gives us the best result than Fuzzy control.

V. REFERENCES

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