

REDUCTION OF NONLINEARITIES FROM A NON LINEAR SYSTEM BY USING FUZZY LOGIC CONTROLLER

Rajbir¹, Sunil kumar²,

¹Department of ECE, ²Department of EE & ³Department of EE

Abstract: In this technical paper a MATLAB model is designed by using Fuzzy logic Controller to controlled the liquid level of multiple tanks system and compares the performance of different tanks system. This model is valuable for future research in tank liquid level controller industries where we need to control the nonlinearities in a nonlinear system.

Here we are using fuzzy logic controller with other controllers (like PID,PI) so that the nonlinearities of the system can be controlled and a better performance of the system can be achieved.

KEYWORDS: Couple tanks system, Model design by MATLAB , PID controller,PIcontroller, PSO,DE.

1. Introduction

Fuzzy Logic is a particular area of concentration in the study of Artificial Intelligence and is based on the value of that information which is neither definitely true nor false. The information which humans use in their everyday lives to base intuitive decisions and apply general rules of thumb can and should be applied to those control situations which demand them. Acquired knowledge can be a powerful weapon to combat the undesired effects of the system response.

Fuzzy logic controllers use a very flexible set of if-then rules. The solution is then applied to appropriate membership functions. Referring to figure 1, values which lie within the shaded area are called true beyond a shadow of a doubt.



Figure.1

Those values which lie within the cross hatched area are called false beyond a shadow of a doubt. If all data falls to one side or the other of the overlap area, then Fuzzy Logic probably would be of little benefit.

In most applications there are some points which lie in the common area. Information which lies within the common area has to be studied, stored, and used to quantify and to classify the data. This allows for smart manipulation of the data structure in order to make inference to a solution. Information which falls in that common area can be ranked, aged, and "best guess" made after evaluation of this "gray" information.

Another advantage of Fuzzy Logic controllers is to quantify the input signal in a sometimes "noisy" environment. This noise, which tends to corrupt the integrity of the actual signal, is dealt with through the common sense of the competent operator. Mathematically, the information must be judged and prepared for use in decision making. If an operator took the time to plot the process information on an X-Y coordinate system, the operator could visually apply a curve fit to the data and come up with a fairly accurate generic representation.

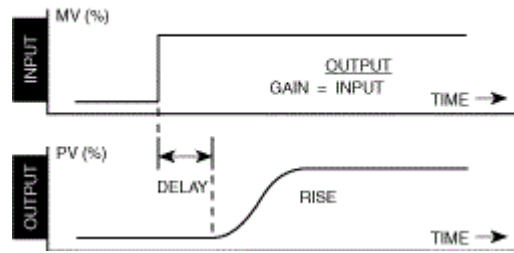


Figure.2

2. Plant Description:

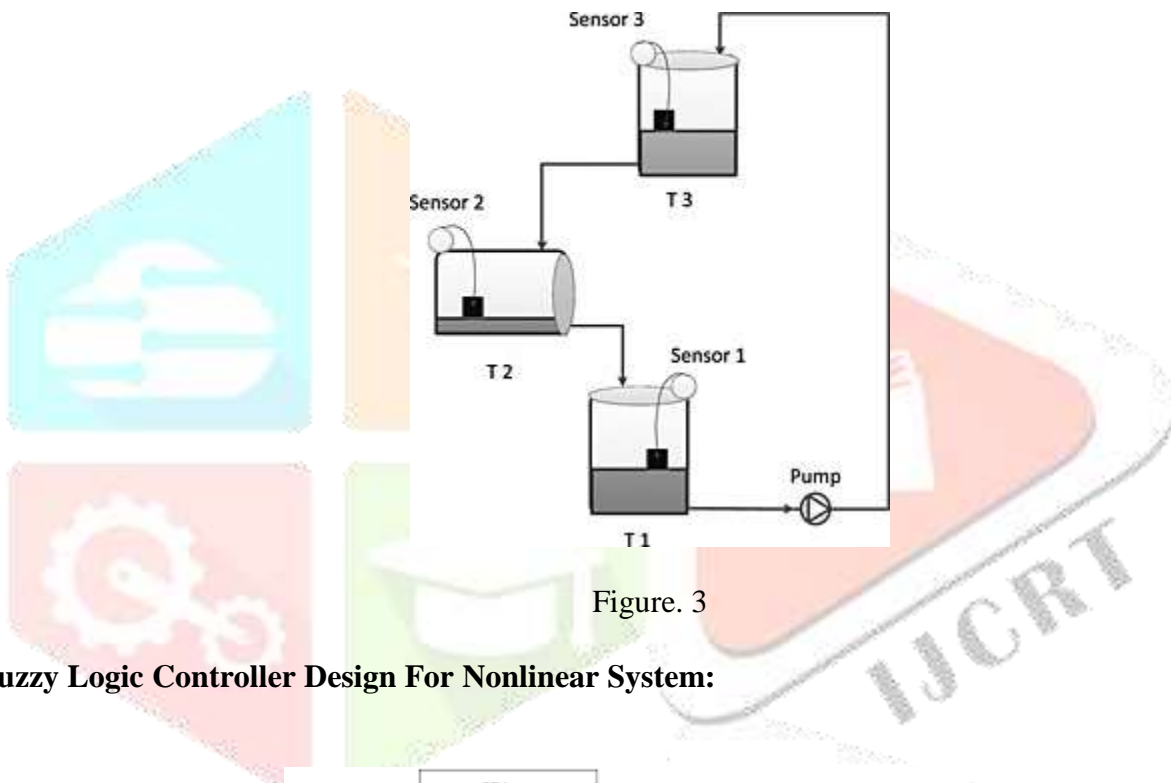


Figure. 3

3. Fuzzy Logic Controller Design For Nonlinear System:

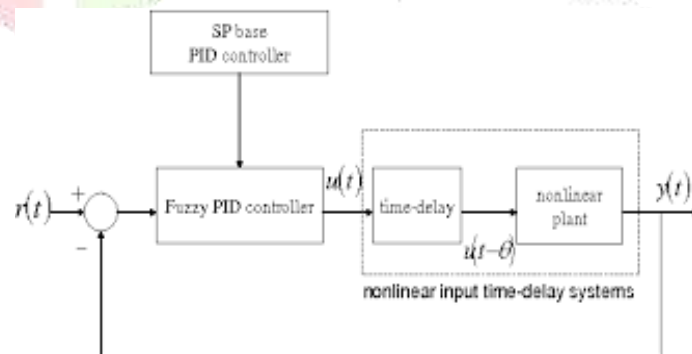
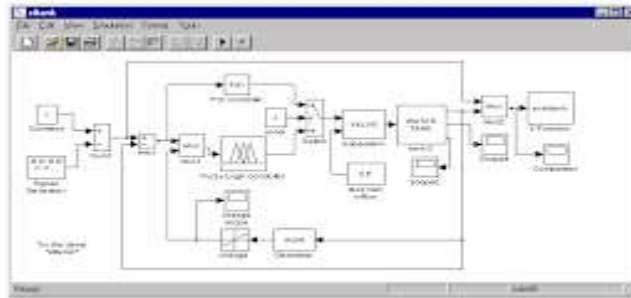


Figure .4



4. Simulation Results:



5. References: