CHAPTER ONE

INTRODUCTION

1.1 Preface

Electric heaters have been used as source of heat for decades. The reason for that is ease of maintenance compared to other sources of heat and precision control of temperature, electric heat can be accurately applied at the precise point needed in a process, at high concentration of power per unit area or volume. There are many applications including space heating, water heating and industrial processes. Water heating is the process that uses an energy source to heat water above its initial temperature. However the use of electric heaters also has disadvantages Higher Cost/unit of heat compared to other fuels and Humidity control.[1]

For improvement and perfection of the response of temperature of the heater it's controlled using PID controller with Fuzzy logic.

Proportional Integral Derivative (PID) controller in general for a long time have been used due to their feasibility, easy to be implemented, simplicity, inexpensive cost, and effectiveness for linear systems [2], although If the system parameters cannot be precisely estimated or achieved, that present low robustness. Also the PID present low efficiency when it control non-linear system. The control of temperature of heaters is a non-linear, time delay time varying that imply the use of Fuzzy logic because Fuzzy logic optimize the PID controller.

1.2 Problem Statement

The problem is that in industrial applications if the temperature of the gas or water in the heaters is not accurate that produces hazard. In other words it is necessary in industrial scope to maintain the proper temperature of the water or gas heating in less time potential.

1.3 Proposed Solution

To develop a Fuzzy logic based controller to control the temperature of the heater.

1.4 Objectives of the study

The purpose of this study is to establish best performance of the heaters by developing the system mentioned in the proposed solution and to examine the performance of the Fuzzy PD controller in heater by comparing the result obtained with the results of the respective conventional PD controller algorithms.

1.5 Methodology

The mathematical model of the water heater is to be established by applying the principle of energy conservation in the electric water heater system. In the MATLAB software environment, using Simulink blocks the heater system is to be tested and its performance evaluated using conventional PD controller then using Fuzzy logic toolbox in the Simulink of the MATLAB.

1.6 Research outlines

This research composed of five chapters, Chapter one includes introduction of the project, problem statement, proposed solution of the

project and brief methodology. Chapter two represents background and literature review of the case study. Chapter four consists of the system design that describes the PD controller and fuzzy PD controller simulations. Chapter four represents obtained results of the project simulations. Chapter five provides the final conclusion and recommendation.