COMPARATIVE ANALYSIS OF A SINGLE AREA LOAD FREQUENCY CONTROL USING INTELLIGENT CONTROLLERS

A Dissertation Submitted towards the Partial Fulfillment for the Award of Degree of

MASTER of TECHNOLOGY

In

CONTROL AND INSTRUMENTATION

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16/C&I/2010

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CERTIFICATE

This is to certify that the project entitled "COMPARATIVE ANALYSIS OF A SINGLE AREA LOAD FREQUENCY CONTROL USING INTELLIGENT CONTROLLERS" is the bona fide work carried out by SUPRIYA SHARMA, student of M.Tech (Part time), Delhi Technological University, as her major project in partial fulfillment of the requirements for the award of the M.Tech Degree and that the project has not formed the basis for the award previously of any degree, diploma, associate ship, fellowship or any other similar title.

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ACKNOWLEDGEMENT

A project report is the result of not only work of the student but also a symbol of guidance, encouragement and help given by many people. This is actually a teamwork done by many people including research guide and friends. So before presenting the work I would like to serve my sincere regards and thanks to all those people who have helped me during my Project.

I wish to express my sincere gratitude to My Advisor **Dr. Rachana Garg**. She actively involved herself in the project and offered useful support at every stage of my project. My sincere thank is directed to **Prof. Parmod Kumar** for his guidance in the right direction.

I give my sincere appreciation to my teachers at D.T.U. for teaching me with the best of their knowledge. I also appreciate the support provided by all the lab staff at D.T.U. throughout my degree.

I owe my loving thanks to my parents, my sister, my brother and my dear husband for their unconditional support.

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ABSTRACT

Power quality of a system can be improved by keeping the frequency and voltage magnitude within tolerable limits. As the load increases, the system frequency drops and vice versa. This variation in the frequency is undesirable and is taken care by load frequency control. Load frequency control mainly helps to keep the frequency within limits and to give zero steady state error. It is the basis of many advanced concepts of the large scale control of the power system. When dealing with the LFC problem of power systems, unexpected external disturbances, parameter uncertainties and the model uncertainties of the power system pose big challenges for controller design.

In this study, Intelligent controllers like Hybrid Neuro-Fuzzy and Fuzzy tuned PID controllers for load frequency control of a single area thermal power system are designed and the results are compared with the conventional PI and PID controllers. Fuzzy logic based intelligent control technique for tuning the conventional controller provides a formal method for implementing the human heuristic knowledge in the form of control rules. The FLC tune the proportional (K_p), integral (K_i) and derivative (K_d) gains of the conventional PID controller depending upon the frequency error (e) and the change in frequency error (ce). The characteristics of a fuzzy system such as robustness and adaptability can be successfully incorporated into the controlling method for better tuning of PID parameters. A Neuro-Fuzzy system is a Fuzzy system that uses a learning algorithm derived from neural network theory to determine its parameters by processing data samples.

The dynamic responses of all the controllers, intelligent as well as conventional controllers are compared on the basis of maximum overshoot, rise time and settling time.

TABLE OF CONTENTS

CERTIFICATE ii

ACKNOWLEDGEMENT iii

ABSTRACT v

Table of Contents v

LIST OF FIGURES viii

LIST OF TABLES v

NOMENCLATURE vi

CHAPTER-1 INTRODUCTION 1-5

1.1 INTRODUCTION 1

1.2 LOAD FREQUENCY CONTROL 2

1.3 CONTROLLERS FOR LOAD FREQUENCY CONTROL 3

1.4 OBJECTIVE & MOTIVATION FOR THE WORK 4

1.5 THESIS OUTLINE 4

CHAPTER-2 LITERATURE REVIEW 6-8

CHAPTER-3 LOAD FREQUENCY CONTROL 9-19

3.1 INTRODUCTION 9

3.2 LFC AND ITS MATHEMATICAL MODELLING 10

3.2.1 Mathematical Modeling of Generator 11

3.2.2 Mathematical Modeling of Load 12

3.2.3 Mathematical Modeling for Prime Mover: 13

3.2.4 Mathematical Modeling for Governor 13

3.3 AUTOMATIC GENERATION CONTROL 15

3.3.1 AGC in A Single Area 15

3.3.2 Agc In The Multiarea System 16

CHAPTER-4 CONVENTIONAL CONTROLLERS FOR LFC 20-25

4.1 PARADIGM AND THEORY OF CONTROLLERS 20

4.2 CONVENTIONAL CONTROLLERS 20

4.2.1 P Controller 20

4.2.2 PI Controller 21

4.2.2 PID Controller 23
4.2.3 Tuning Of PID Parameters 24
CHAPTER-5 INTELLIGENT CONTROLLERS FOR LFC 26-41
5.1 INTELLIGENT CONTROLLERS 26
5.2 FUZZY LOGIC CONTROLLER AND ITS BACKGROUND 27
5.3 FUZZY TUNED PID CONTROLLER 32
5.3.1 Principle of Fuzzy tuned PID Controller 32
5.3.2 Design and Structure of the Fuzzy tuned PID Controller 33
5.3.3 Advantages of fuzzy-tuned PID controller 37
5.3.4 Shortcomings of fuzzy-tuned PID controller 38
5.4 HYBRID NEURO-FUZZY CONTROLLER 38
CHAPTER-6 SIMULINK MODELING AND RESULTS 42-57
6.1 INTRODUCTION 42
6.2 SIMULINK MODELING OF LFC 42
6.2.1 Single Area LFC Using PI Controller 42
6.2.2 Single Area LFC Using PID Controller 43
6.2.3 Single Area LFC Using Fuzzy Logic Controller 43
6.2.4 Single Area LFC Using Fuzzy-Tuned PID Controller 45
6.2.5 Single Area LFC Using Hybrid Neuro-Fuzzy Controller 46
6.2.6 Two Area LFC Using PID Controller 47
6.3 RESULTS 48
6.3.1 Response of the Single Area LFC with a PI controller 49
6.3.2 Response of the Single Area LFC with a PID controller 49
6.3.3 Response of the Single Area LFC with a Fuzzy logic controller 50
6.3.4 Response of the Single Area LFC with a Fuzzy-Tuned PID controller 51
6.3.5 Response of the Single Area LFC with a Hybrid Neuro-Fuzzy controller 52
6.3.6 Response of the all the Controllers for Single Area LFC 53
6.3.7 Response of the Two Area LFC with A PID Controller 55
CHAPTER-7 CONCLUSION AND SCOPE OF FUTURE WORK 58-60
7.1 CONCLUSION 58
7.2 FUTURE SCOPE 59
7.2.1 Improvement in Controllers 59

7.2.2 Improvement of the Model 59
APPENDIX 61
REFERENCES 62

LIST OF FIGURES

Fig.-3.1: Block diagram for generator 12

Fig.-3.2: Block diagram for generator and load.....13

Fig.-3.3: Block diagram for turbine 13

Fig.-3.4: Graphical Representation of speed regulation by governor.....14

Fig.-3.5: Block Diagram of single area system. 15

Fig.-3.6: Block Diagram of AGC for an isolated power system. 16

Fig.-3.7: Block Diagram of AGC for a two-area system.....19

Fig. - 4.1: Basic block diagram of a conventional P controller 20

Fig. - 4.2: Basic block diagram of a conventional PI controller.....22

Fig.- 4.3: Basic block diagram of a conventional PID controller 24

Fig.-5.1 A pure fuzzy system.....28

Fig.-5.2 Membership functions for both the inputs of fuzzy logic controller 29

Fig.-5.3 Membership functions for the output of fuzzy logic controller 30

Fig.-5.4 control surface.....31

Fig.-5.5 Membership functions for inputs and outputs of Fuzzy-tuned PID controller .34

Fig.- 5.6 Basic structure of a fuzzy-tuned PID controller.....35

Fig.-5.7 control surfaces for (a) K_p,(b) K_i, and (c) K_d using fuzzy-tuned PID controller37

Fig.-5.8 control surfaces for (a) K_p, (b) K_i, and (c) K_d using Hybrid Neuro-fuzzy controller 41

Fig.-6.1 SIMULINK model of LFC using PI controller.....43

Fig.-6.3 FIS editor of Fuzzy logic controller.....44

Fig.-6.4 SIMULINK model of LFC using Fuzzy logic controller.....45

Fig.-6.6 ANFIS editor of Hybrid Neuro-Fuzzy controller.....46

Fig.-6.7 SIMULINK model of LFC using Hybrid Neuro-Fuzzy controller.....47

Fig.-6.8 SIMULINK model of two area LFC using PID controller 48

Fig.-6.9 Response of single area LFC using PI controller.....49

Fig.-6.10 Response of single area LFC using PID controller.....50

Fig.-6.11 Response of single area LFC using Fuzzy logic controller.....51

Fig.-6.12 Response of single area LFC using Fuzzy-Tuned PID controller.....52

Fig.-6.13 Response of single area LFC using Hybrid Neuro-Fuzzy controller.....53

Fig.-6.14 Response of all the controllers (-----PI),(-----PID),(-----Fuzzy logic), (-----Fuzzy-tuned PID) and (-----HNF) for single area LFC 54

Fig.-6.15 Response of frequency variation in area-1 of two area LFC 56

Fig.-6.16 Response of frequency variation in area-2 of two area LFC 56

Fig.-6.17 Response of Tie-line power in area-1 of two area LFC.....57

Fig.-6.18 Response of tie-line power in area-2 of two area LFC 57

LIST OF TABLES

Table.-5.1 Rule base for fuzzy logic controller 30

Table.-5.2 Rule base for K_p, K_i, and K_d of fuzzy tuned PID controller 35

Table 6.1. The comparison of PI, PID Fuzzy logic, Fuzzy tuned PID and HNF controller 55

NOMENCLATURE

LFC	:	Load frequency control
AGC	:	Automatic generation control
ACE	:	Area control error
PI	:	Proportional Integral Controller
PID	:	Proportional Integral Derivative
HNF	:	Hybrid Neuro-Fuzzy
FIS	:	Fuzzy inference system
ANFIS	:	Adaptive Neuro-Fuzzy inference system