شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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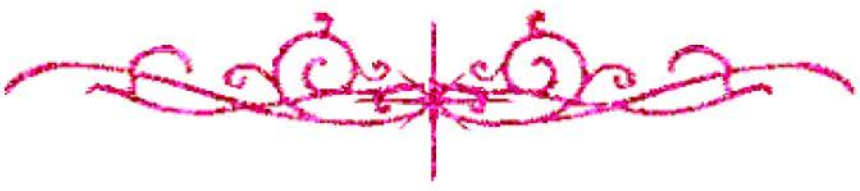

Design and Tuning of Load Frequency Controllers

by

Eng. Mokhtar Hussein Abdel Allah Osman

A thesis submitted to the electrical Power and Machines Department Faculty of Engineering, Cairo University

In partial fulfillment of the requirement for the Degree of

MASTER OF SCIENCE

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Abstract

This dissertation deals with the problem of load frequency control. The aim is to maintain the scheduled system frequency and / or to establish interchange with other areas within its limits. The proposed control has been designed for a four area interconnected power system.

The starting point is the conventional PI controller but we will investigate a new approach in the control law by adapting a formulation for area control error which always guarantees zero steady state error and inadvertent interchange.

Tuning the gains of the PI controller is an on-going research point. Fuzzy systems are used to adapt the PI parameters. Also, we will investigate the possiblity of replacing the conventional PI controller by a fuzzy controller. Furthermore, the fuzzy system itself may be needed to tune(scaling factor, the posistion membership function and the rule base). Tuning of fuzzy systems(scaling factor) will be done based on a genetic algorithm. Also, we will discuss the effect of the genetic algorthim paramters (e.g crossover, mutation, fitness function).

We will investigate generalized predicitive controllers for our problem and will discuss the effect of GPC's parameters (control horizon, minimum output horizon and maximum output horizon). We will use the genetic algorthim to tune GPC's parameters (control horizon, minimum output horizon and maximum output horizon). Finally, we will hold a comprehensive comparison among all controllers considered in the thesis. We will use the PI controller as a reference to compare the controllers and show the level of performance for each controller.

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