بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــســـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

TANTA UNIVERSTY
FACULTY OF ENGINEERING

Fuzzy Logic and Genetic Algorithms Applied to Intelligent Control System Design

Thesis submitted to
The Computers and Automatic Control Department

Master of Science

By
Eng. Ahmed Ahmed Mohamed Ramadan,
B.Sc. in Electrical Engineering (computers and Automatic control)

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Arab Academy for Science and Technology

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2002

بسم الله الرحمن الرحيم

وما أوتيتم من العلم إلا قليلا

صدق الله العظيم

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Dedication

I would like to dedicate this dissertation to my great parents, my brothers, and my sisters who have supported and encouraged me throughout my academic career. Thanks for showing infinite patience and the will to always listen to me in the most troublesome moments during my work in this thesis.

Ahmed A. Ramadan

Abstract

The design methods of fuzzy logic controllers (FLCs) using the genetic algorithms (GAs) are appearing as systematic methods. These methods easily provide an optimized design and form the framework for further progress. This thesis describes the optimal design of P-, PI-, PD-, PID-like FLCs based on theoretical fuzzy concepts and genetic-based optimizations. In the case of PI-like FLC, the most important feature of the proposed controller is its simple structure consisting of three gain factors and a FLC with each of the two inputs and the output has only three membership functions. Through GAs, the optimal values for the gain factors associated with each of the inputs and the output of the FLC is achieved without changing the membership functions or the rule-base of the FLC itself.

The proposed method is applied to the problem of designing an optimal PI-like fuzzy logic speed controller for an induction motor [Kao & Liu 92] , one time without limiting the output of the controller and another time with limiting the output of the controller. The performance of the compensated system is judged compared to that of conventional PI and genetic-based PI controllers. Good simulation results were obtained using the proposed method, which produced superior control performance in handling plant parameter changes and in speeding up the response.

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