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شبكة المعلومات الحامعية

بسم الله الرحمن الرحيم



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شبكة العلومات الحامعية



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم





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شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسو

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بالرسالة صفحات لم ترد بالأصل



Minoufiya University Faculty of Engineering Electrical Engineering Department

Pulse Width Modulation-Based Control Technique of a DC Motor

A thesis submitted by

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Arab Company For Special Steel (ARCOSTEEL), Sadat, Egypt.

For the Award of the Degree of Master of Science In Electrical Engineering

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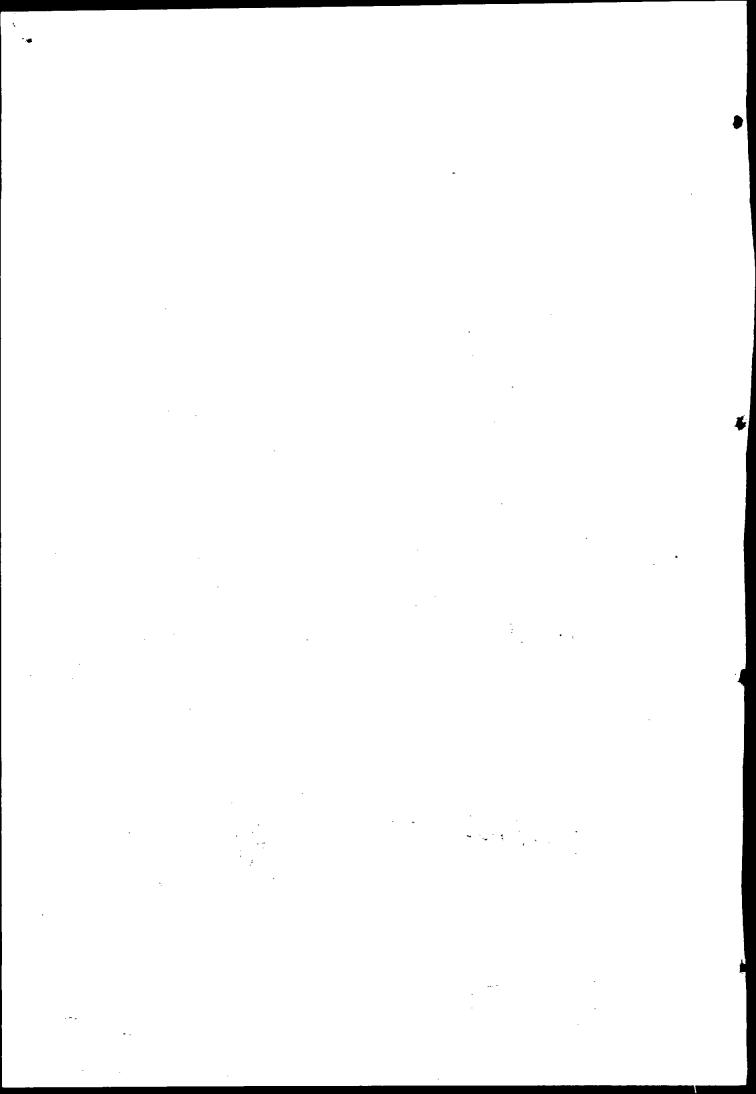
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Eng. Said Ahmed Soliman El Absawy

ABSTRACT

In industrial applications, speed control is required over a wide range to follow accurately a certain command trajectory and to recover quickly from sudden load applications. The precise control of a DC motor is necessary when the dynamic responses greatly affect the quality of the product. The design of conventional control drives therefore should take another dimension due to the restricted requirements of the modern industrial applications. Improving the performance of such drives has become the principle aim of many researchers. Artificial intelligence (AI) Fuzzy Logic Controller will be implemented to solve the undesired undershoot that get the process in special steel rolling mill out of control. Comparing the performance of DC motor, controlled by PI speed controller, PI Speed with PI current controller and fuzzy speed controller, will be done and these systems will be emulated practically. As Fuzzy Logic Control has steady state error due to load variation, so, two methods will be implemented to improve the fuzzy controller performance to allow it to solve the steady state error problem. These methods are:

- 1- Using Fuzzy Speed and PI current Controller.
- 2- Using a Hybrid Fuzzy-PI controller.

A Complete modeling and simulation is carried out for the system under study which consists of a separately excited DC motor fed from an uniform pulse width modulation converter through a power MOSFET and controlled by the previous controllers. Also, transient and steady state conditions are investigated. The proposed Hybrid Fuzzy-PI controller technique is applied to the system under study, this technique can solve the common problems associated with rolling mill application. The entire drive system is implemented using a high speed digital signal processor (DSP). The experimental results validate the theoretically simulated speed and current responses at different operating conditions.

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