AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
ELECTRIC POWER & MACHINES DEPARTMENT

DIRECT TORQUE CONTROLLER DRIVEN BY ARTIFICIAL INTELLIGENT METHODS FOR SPEED REGULATION OF INDUCTION MOTOR

A thesis submitted to Ain Shams University for the requirements of the degree of MASTER OF SCIENCE IN ELECTRICAL ENGINEERING
(Power & Machines)

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بسم الله الرحمن الرحيم

APROVAL SHEET

For thesis with title

Direct Torque Controller Driven by Artificial intelligent Methods for Speed Regulation of Induction Motor

Presented by

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Submitted in partial fulfillment of the requirements for the M.Sc. degree in electrical engineering

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Statement

This thesis is submitted to Ain Shams University in partial fulfillment of the requirements for M.Sc. degree in Electrical Engineering.

The included work in this thesis has been carried out by the author and no part of this thesis has been submitted for a degree or a qualification at any other university or institution.

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ABSTRACT

Direct Torque Control (DTC) is one of the latest developments in ac motor control. It provides high torque dynamic response. DTC almost re-establishes the advantages of the dc drive through implementation of direct torque and flux control, which electrical engineers and researchers were looking for.

This thesis presents the DTC concept & principles and studies the dynamic behavior of a direct torque controlled three-phase induction motor based on a simulation of the mathematical model of the motor along with the inverter circuit and the representation of the DTC main blocks in such a simple way.

For purpose of enhancing the DTC system, a suggested fuzzy logic DTC is introduced. The simulation results of the FL- DTC have already shown a significant torque ripple reduction.

This thesis also illustrates how the DTC can become a base for speed control. A conventional (fixed gain) proportional plus integral (PI) controller is used for closing the speed control loop. The effect of changing the proportional gain, in the PI controller is investigated. This has led to the introduction of a FL-PI controller. The simulation results of the FL-PI controller show a better speed dynamic response. Finally, the switching ability between torque control & speed control is introduced and illustrated by an explanatory example.

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