

# **NEURAL NETS AND FUZZY LOGIC IN INDUCTION MOTOR DRIVES**

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## **ABSTRACT**

Induction motor drives have recently become an interesting field of research for control engineers. In order to deal with the highly non-linear behavior of induction motors, neural networks and fuzzy logic control have been developed. The advantage of developing such intelligent tools is the in-built non-linearity, which helps to simulate a real life system better over conventional techniques. Another advantage of neural networks is parallel processing, which improves the performance in real-time applications. Neural network has been developed to model an induction motor, used for real-time estimation of torque and flux. A multi-layer feed-forward modular network has been designed and results when compared with multi-layer feed-forward network have been found better. This helps in proper estimation of actual torque and flux, which when compared with the desired torque and flux calculate the corresponding errors. As a result proper estimation of torque and flux errors is of utmost importance.

The paper further deals with collection of input and output data for supervised training. It deals with the training process adopted for effective training of the neural network. A fuzzy controller controls the firing of the semiconductor devices to maintain the desired output. Direct torque control techniques have been adopted for design of the fuzzy controller. The fuzzy thinking of human beings is imbibed in the fuzzy controller of induction motor. The controller selects the proper state-space vector to control the torque

and flux errors. This helps to maintain constant desired speed of the motor under varying load conditions. Various test simulation results have been presented. The neural estimator has been interfaced with the fuzzy controller to make a complete intelligent induction motor drive. On-line results of the neural estimator and simulation results of the fuzzy controller of induction motor have been discussed in the paper.

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**Key Words:** Neural Networks, Fuzzy Logic Control, Induction Motors, Parallel Processing, Reral Time Applications, Multi Layer Feed Forward Network,

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