A novel design of an adaptive neuro-fuzzy inference strategy (ANFIS) for controlling some of the parameters, such as speed, torque, flux, voltage, current, etc. of the induction motor is presented in this paper. Induction motors are characterized by highly non-linear, complex and time-varying dynamics and inaccessibility of some of the states and outputs for measurements. Hence it can be considered as a challenging engineering problem in the industrial sector. Various advanced control techniques has been devised by various researchers across the world. Some of them are based on the fuzzy techniques. Fuzzy logic based controllers are considered as potential candidates for such an application. Fuzzy based controllers develop a control signal which yields on the firing of the rule base, which is written on the previous experiences & these rules are fired which is random in nature. As a result of which, the outcome of the controller is also random & optimal results may not be obtained. Selection of
the proper rule base depending upon the situation can be achieved by the use of an ANFIS controller, which becomes an integrated method of approach for the control purposes & yields excellent results, which is the highlight of this paper. In the designed ANFIS scheme, neural network techniques are used to select a proper rule base, which is achieved using the back propagation algorithm. This integrated approach improves the system performance, cost-effectiveness, efficiency, dynamism, reliability of the designed controller. The simulation results presented in this paper show the effectiveness of the method developed & has got faster response time or settling times. Further, the method developed has got a wide number of advantages in the industrial sector & can be converted into a real time application using some interfacing cards.

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Modeling, Design & Simulation of an Adaptive Neuro-Fuzzy Inference System (ANFIS) for Speed Control of Induction Motor


Index Terms

Computer Science Fuzzy Systems

Key words

ANFIS Fuzzy Logic

Membership functions

ANN
Controller
Simulink
Matlab
Induction motor
Closed loop

Parameter