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DEVELOPMENT OF A DETECTION AND CLASSIFICATION METHOD FOR INDUCTION MOTOR FAULTS USING MOTOR CURRENT SIGNATURE ANALYSIS AND FEEDFORWARD NEURAL NETWORK

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AUTHOR'S DECLARATION

I declare that the work in the thesis was carried out in accordance with the regulation of Universiti Teknologi MARA. It is original and is the results if my own, unless otherwise indicated or acknowledge as a reference work.

I, hereby acknowledge that have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

In this thesis, a predictive maintenance method for the development of a detection and classification method for comprehensive fault conditions in induction motors (IM) is proposed. Induction motors are taken into account because they are commonly utilized in industrial and commercial plants worldwide. Fault detection and classification (FDC) of IMs are important in order to avoid unpredicted breakdown of electrical motors. The inherent failures due to unavoidable electrical stresses in motors results in motors experiencing stator faults, rotor faults and unbalanced voltage faults. If these faults are not identified in the early stage, it may become catastrophic to the operation of the motor. In this thesis, the detection and classification of induction motor faults due to electrical related failures using Motor Current Signature Analysis (MCSA) and Feedforward Neural Network (FNN) neural network is proposed. Data collection of current signal of motors with different fault conditions is carried out by using laboratory experiments. The data collected which consists of the three phase stator current signals in different motor fault conditions is analysed using MCSA method. Power spectral density (PSD) method is then utilized to extract three phase stator current signals to obtain the frequency spectrum of stator currents via Fast Fourier Transform (FFT) as the data input which is fed into the FNN classifier. As it is important to choose proper training algorithm for training the FNN, therefore three different FNN training algorithms are compared in terms of their accuracy, number of iterations and training time.

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