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Faulty Bearing Detection, Classification and Location in a Three Phase Induction Motor based on Stockwell Transform and Support Vector Machine

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Abstract

This paper presents faulty bearing detection, classification and its location in a three-phase induction motor using Stockwell Transform and Support Vector Machine. Stockwell Transform is applied to stator current signals to extract a number of features in both time and frequency domain. A set of non-correlated and high ranking features are selected based on Fisher score ranking. These features are in turn used to classify the faults such as ball, cage and outer-race faults using Support Vector Machine. Subsequent to fault identification, features of Stockwell Transform are used to locate the defective bearing, i.e, either at fan-side or load-side of the motor. This algorithm is successfully implemented on the experimental data of defective bearings collected from the industry.

Keywords: Bearing fault diagnosis, Stockwell Transform, Multi-class SVM, Feature selection, Three- phase induction motor

1. Introduction

Induction motors are widely used motors for industrial and domestic applications. Most of them are exposed to various types of environments which cause heat, mechanical stress and corrosion depending on the application. These stresses lead to the development of incipient faults that are non-detectable in nature due to the low sensitivity of protection

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