The Effect of Variation Resistance Broken Bars in Induction Motor Using Stator Current Signature Analysis

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Abstract - In all mechanical devices, motors are subject to failures, which can sometimes lead to the shutting down of an entire industrial process. For that fault prognosis has become almost indispensable. Motor current signature analysis is a condition monitoring technique that is now widely used to diagnose problems such as broken rotor bars, abnormal levels of airgap eccentricity, shorted turns in low voltage stator windings and some mechanical problems.

This paper presents the effect of the broken bar time evolution since the created incipient fault on the various characteristics of the induction machine such as torque, speed and currents. This one is simulated while the rotor bar resistance may be varied linearly versus time since its normal value to the final broken bar situation (partial to total broken bar).

The methods of analysis used are based on:

- the *Lissajous* representation of *Park* vector current components
- spectral analysis of stator current and the modulus of *Park* vector current

By this way, we can observe the incipient fault impact on the different characteristics of the machines quantities (torque, speed and currents).

Keywords: Fault simulation, condition monitoring, induction motors, broken bar; resistance bar; incipient fault, *Park* extended vector current, modulus, stator current.

1. Introduction

The problem of the diagnosis is indeed related to that of the maintenance, utilizing economic factors, which are difficult to evaluate. The issues of preventive and condition-based maintenance, on line monitoring, system fault detection, diagnosis and prognosis are of increasing importance.

The key issues for a successful motor operation are a quality motor, understanding its application, choice of the proper one for the application and its proper maintenance. The use of induction motors in today's industry is extensive and they can be exposed to different hostile environments, manufacturing defects, etc… [1].