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DWT and Hilbert Transform for Broken Rotor Bar Fault Diagnosis in Induction Machine at Low Load

B. Bessam^{a,b}, A. Menacer^a, M. Boumehraz^b, H. Cherif^{*}

^aLGEB Laboratory, Department of Electrical Engineering, University of Biskra, BP 145, 07000, Biskra, Algeria

^bLMSE Laboratory, Department of Electrical Engineering, University of Biskra, BP 145, 07000, Biskra, Algeria

^{*}LGEB Laboratory, Department of Electrical Engineering, institute of sciences and technology, University El-Oued, Algeria,

Abstract

In this paper a new technique for broken rotor bars diagnosis in induction machine at low load and non stationary state is proposed. The technique is used in order to remedy the problem from using the classical signal-processing technique FFT by analysis of stator current envelope. The proposed method is based from using discrete wavelet transform (DWT) and Hilbert transform. The Hilbert transform is used to extract the stator current envelope. Then this signal is processed via DWT. The efficiency of the proposed method is verified by simulation tests.

Keywords: Induction Motor, Diagnosis, Hilbert transform, discrete wavelet transform;

1. Introduction

Three-phase induction motors are the "workhorses" of industry. They are the most widely used electrical machines, for their reliability and simplicity of construction. In an industrialized nation, they can typically consume between 40% and 50% of all the generated capacity of that country [1]. But, they are subject to failures, which may be inherent in the machine itself, or due to operating conditions. Failure surveys [2], have reported that percentage failure by components in induction motors is typically:

- stator related (38%);
- rotor related (10%);
- bearing related (40%);
- and others (12%).

But, in recent years, due to the need to support the severe voltage stresses of solid-state inverters, and to operate in highly corrosive and dusty environments, the design and build quality of stator windings have achieved marked