

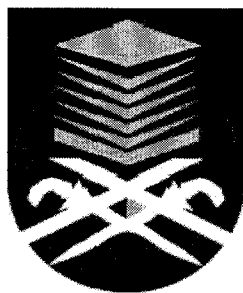
COMPUTATION OF END-WINDING INDUCTANCE OF RELUCTANCE MACHINES

Project report is presented in partial of fulfillment for the award of the

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In the name of ALLAH

Most Gracious and Most Merciful

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ABSTRACT

The inductance of an electrical machine is hard to be calculated. Nowadays, advancement in finite-element analysis and computer hardware has allowed the calculation of the end-winding inductance of electrical machines or Switched-Reluctance Motor (SRM) more easily. Therefore, this paper introduces a computation of end-winding leakage inductance of electrical machines due to the effect in the end winding itself by using Finite Element Method Magnetics. It is based on a 2D geometric model of the end winding region. The main objective of this paper is to obtain the general empirical curves or equations by means of finite element analysis with the FEMM software.

Keyword: Finite Element Method Magnetics, End Windings, Inductance

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Machines are the important system in the world. Since the machines became a widely used in the world so based on that various types of machines have been created one of it are Switched Reluctance Machines (SRM). SRM are receiving significant attention from industries in the last decade because of the advantages it possesses. They are extremely inexpensive, reliable and weigh less than other machines of comparable outputs power. Although the design principles of the machine are available as a concatenation of many different sources, the need for a combined, step-by-step design procedure from first principles of electromagnetic is an absolute requirement [1]. The winding ends of the rotating electrical machines have leakage field (when flowed by currents) and corresponding leakage inductance. The performances of an electric machine are given by the parameters corresponding to the equivalent electric scheme. For example, the behavior and the performances of an AC machine depend on the total leakage inductance, but this is determined in the design phase as a sum of the inductances corresponding to the leakage flux in different portions of the machine. The numerical analysis based on the finite elements method (FEM) is probably, at present, one of the best instruments regarding the precision of the obtained results, having the great advantage that it can already be executed in the phase of its design/optimizing [2]. SRM is generally believed to demonstrate good potential in power density, torque/inertia ratio,