DYNAMIC SIMULATION OF SWITCHED-RELUCTANCE MOTOR USING MATLAB/SIMULINK

This thesis is presented in partial fulfillment for the award of the
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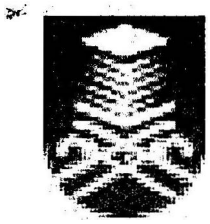

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ABSTRACT

The dynamic simulation of the SR motor is fairly demanding in terms of computer resources. The introduction of SIMULINK from MathWorks greatly simplifies the task. In this work, the nonlinear flux-linkage versus current model of the SR motor is implemented as a m-file S-function using the MATLAB's two-dimensional interpolating function.

The performance of a two-phase 4/6 pole SR motor is investigated. The simulation results for a simple current control considered to be reasonable but further work is required to implement control algorithm for accurate speed and torque control.

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CHAPTER 1

PRINCIPLE OPERATION OF SRM

1.1 INTRODUCTION

Electric machines can be broadly classified into two categories on the basis of how they produce torque-electromagnetically or by variable reluctance. In the first category, motion is produced by the interaction of two magnetic fields, one generated by the stator and the other by the rotor. Two magnetic fields, mutually coupled, produce an electromagnetic torque tending to bring the fields into alignment. The same phenomenon causes opposite poles of bar magnets to attract and like poles to repel. The vast majority of motors in commercial use today operate on this principle. These motors, which include DC and induction motors, are differentiated based on their geometries and how the magnetic fields are generated. Some of the familiar ways of generating these fields are through energized windings, with permanent magnets, and through induced electrical currents.

In the second category, motion is produced as a result of the variable reluctance in the air gap between the rotor and the stator. When a stator winding is energized, producing a single magnetic field, reluctance torque is produced by the tendency of the rotor to move to its minimum reluctance position. This phenomenon is analogous to the force that attracts iron or steel to permanent magnets. In those cases, reluctance is minimized when the magnet and metal come into physical contact. As far as motors that operates on this principle, the switched reluctance motor (SRM) falls into this class of machines.