

**A SIMULATION STUDY OF SWITCHED RELUCTANCE MOTOR
DRIVEN BY A PID CONTROLLER**

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ABSTRACT

Although, the switched -reluctance motor (SRM) drives are still at development stage, their applications are projected to grow very fast. The switched- reluctance (SR) motors excels at very low end of the speed being able to provide high torques with excellent dynamic capability, and at very high speeds due to its robust rotor. Acoustic noise is an area where SR technology has made the greatest advances in recent years due to a combination of electromagnetic design elements, electronic techniques and attention to mechanical design. SR systems are used in clothes washers, food processors, vacuums, power tools and other high performance applications. The SR motor is a variable speed machine. Its torque and speed may be controlled by controlling the excitation time or modulating the excitation with suitable feedback signals. In industrial automation fields, conventional PID control is acting a very important role, but its robustness is very weak. In this paper, the basis of PID controller technique is introduced. A PID controller is a feedback controller where the output of the controller is based on the summation of the proportional gain K_P multiplied by the error, the integral gain K_I multiplied by the integral of the error, and the derivative gain multiplied by the rate of change of the error. The objective of this project is access the applications PID controller in SR motor control using simulink.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF PROJECT

Although, the switched reluctance motor (SRM) drives are still at the development stage, their applications are projected to grow fast [1]. The switched reluctance motor is an electric motor in which its torque is produced by the tendency of its moveable part to move to a position where the inductance of the excited winding is maximized. Unlike all other motors, the rotor of the SRM is in all respects a passive device, with no coil winding or permanent magnets. These features make them well suited to operate in industrial environments. Also, as they do not have any mechanical brushes or contacts, they have smaller frictional losses and thus can operate more efficient over a wide range of speeds. The main advantages of SR motors are simple structure, ruggedness, and that they are relatively inexpensive to manufacture.

However, despite the many advantages that SRMs possess over other electrical motors, a disadvantage is that they have highly complex and nonlinear motor characteristics. This is mainly due to their doubly salient structure, and the fact that for maximizing operational efficiency they are normally designed to operate under heavy magnetic saturation. This leads to highly nonlinear torque characteristics. Therefore, unlike other types of motor (such as dc, brushless dc, induction), precise modelling of the SRM characteristics is difficult. This creates an obstacle for accurately predicting and evaluating its performance for applications, developing control algorithms, or defining analytical characteristics and models of the motor for practical and research purposes [2].

Dynamic simulation has been proven to be immensely useful when it comes to system modelling and control system. This because it saves the time and money that would otherwise be spent in prototyping a physical system. Profits that one