MODELING OF SIMPLE AC TRACTION DRIVE USING MATLAB/SIMULINK

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ABSTRACT

This paper presents a simulation study of performance characteristics of a simple AC traction drive using simulation model developed based on MATLAB/Simulink software. The availability of this developed simulation model enables the operational behavior of the performance parameters to be determined and analyzed. The understanding of these performance characteristics behaviors, particularly its dynamic characteristics are significantly important for design analysis. It provides vital information for selecting of precise design specifications and accurate prediction of performance characteristics of the developed drives system when operating over wide variation of load and speed characteristics. This subsequently will lead to the better understanding of operating the drives system at high optimum operating efficiency.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

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Recently, there is an increasing trend of using AC traction in many industrial and commercial drives applications such as in electric vehicle drives. This is due to its possessing several advantageous as compare with DC traction for powering and driving electric vehicle [1]. It offers many beneficial features such as high performance, compactness and lighter weight, easier maintenance due to contact-less circuits and brushless motors, lower cost and high reliability [2]. Previously, DC traction is preferred because of the simplicity in nature of its control system. However, the availability of modern day high rating and fast switching capacity power electronic devices in the markets has contributed to the reduction in complication in the development of AC traction controllers.

In this project, the modeling of AC traction drive system used a three phase induction motor as it main traction motor. The used of three phase induction motors as a driving source provide several advantages such as economical benefits on its maintenances [1], which is much easier rather than single phase induction motor. This three phase induction motor is fed by pulse width modulation (PWM) voltage source converter which generated variable frequency supply input for the traction system. With this PWM, combined with other control techniques, the flexibility in speed and torque control obtained will be the same as if control with DC machines [3]. The basic block diagram of the developed traction drives system is shown in Figure 1.