

MODELLING OF THREE PHASE INDUCTION MACHINE USING SIMULINK

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In the name of Allah, Most Beneficent and Most Merciful. All good ascription's, devotions, good expressions, prayers are for Allah. I bear witness that there is no god save Allah alone, no partners unto Him, and I bear witness that Muhammad is as his servant and His messenger, sent him along with the truth, as giver of glad tidings and as a Warner, and to tell that the hour is fast-approaching, no doubt in it. Peace be on you, O the Prophet, and Allah's mercy and His blessings. Peace be on us and on Allah's upright servants. Allah, forgive me and straighten me.

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ABSTRACT

This thesis describes the simulation of three phase induction machines in the stationary reference frame using the SIMULINK software package of MATLAB. This model is based on two-axis theory of the stationary reference frame. The model uses the voltage source and mechanical torque as inputs and per unit speed and electromechanical torque as outputs.

Simulation of the three-phase induction machine in the stationary reference frame can be used in the transient studies of adjustable-speed drives.

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CHAPTER 1

INTRODUCTION

1.1 Three phase induction machine

Three-phase induction machines are asynchronous speed machines, operating below synchronous speed when motoring and above synchronous speed when generating. They are comparatively less expensive to equivalent size synchronous or dc machines and range in size from a few watts to 10,000hp [1]. As motors, they are rugged and require very little maintenance. However, their speeds are not as easily controlled as with dc motors. They draw large starting currents, typically six to eight times their full load values, and operate with a poor lagging power factor when lightly loaded. This thesis describes the model of three-phase induction machine in the stationary reference frame using SIMULINK. This model can be used in the transient studies of adjustable-speed drives.

In beginning of this thesis, the basic transformations are used to transform the voltage, flux linkage and torque equations for a symmetrical induction machine expressed in terms machine variables to arbitrary reference frame. Then, the transformation to arbitrary reference frame is modified to accommodate the rotating circuit. Finally the, the SIMULINK software is used to illustrate the dynamic performance of typical induction machines.

1.2 SIMULINK software

MATLAB software has become more and more popular in all engineering fields today. It can be considered as the world standard for simulation and analysis of linear and nonlinear dynamic systems, and as the most versatile numeric analysis toolbox. The MATLAB is an acronym for MATrix LABoratory[2].