SENSORLESS SPEED MEASUREMENT IN INDUCTION MOTOR DRIVES USING A DOUBLE ALGORITHM APPROACH

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ABSTRACT

Sensorless speed control in induction motor drives is a new emerging field offering many benefits over traditional methods. The thesis examines a method of improving the performance of sensorless speed control systems using a double algorithm approach. The rotor slot harmonics are used to determine the speed of an induction motor. This is possible as the rotor slots produce slot harmonics in the airgap field, which modulate the stator flux linkage at a frequency proportional to the rotor speed. This method, however, has limitations, at low revolutions the harmonics cannot be detected. An empirically derived formula is used to determine the speed of rotation in the speed range where the rotor slot harmonics cannot be used. The rotor slot harmonics are located and the empirical formula determined for a given 0.33HP induction motor. The final proposed system uses both mentioned methods and is simulated to determine the theoretical performance. The speed detection algorithm using the rotor slot harmonics is also implemented, with good results.

DECLARATION

I declare that this is my own work. It is being submitted for the degree of master of technology in information engineering at Massey University. It has not been submitted before for any degree in any other university.

I would like to dedicate this thesis to the Lord, who has given me inspiration and direction throughout the project. Also to my wife, Kaaren, who has supported me all the way.

PREFACE

The research was undertaken in order to fulfill the requirements for the master of technology degree in information engineering. The research undertaken was aimed at finding methods of improving on existing sensorless speed control techniques. I wish to thank the Eastern Institute of Technology for funding the research undertaken, as well as the supervisors Ibrahim Al-Bahadly and Subhas Mukopadhyay who contributed towards the completion of the research.

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