KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
ELECTRICAL ENGINEERING DEPARTMENT
EE-462 ELECTRICAL MACHINES

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Experiment # 9

EFFECT OF ROTOR RESISTANCE ON THE TORQUE–SPEED CHARACTERISTICS OF THREE PHASE INDUCTION MOTORS

INTRODUCTION

A conventional induction motor with squirrel-cage rotor has about 5% drop in speed from no load to full load and is thus substantially a constant-speed motor. Employing a wound-rotor motor and inserting external resistance in the rotor circuit achieves speed variation but results in poor efficiency. Variation of starting torque with rotor-circuit resistance can be seen in figure 1. It is clear that we can obtain higher starting torque by inserting external resistance in the rotor circuit and then cutting them out eventually for the normal running conditions in order to operate the machine at a higher efficiency. In addition, it is quite clear that the insertion of the rotor resistance shifted the whole torque-speed characteristics towards the value of slip corresponding to 1.

Creating a sufficiently large rotor-circuit resistance might make it possible to achieve an almost linear torque-slip relationship for the slip range of 0 to 1.

OBJECTIVE

The objective is to measure the torque-speed characteristics of a 3-phase induction motor under different values of rotor resistance.

PROCEDURE

1. Connect the 3-phase Induction motor to the rated voltage when no external rotor resistance is inserted.
2. Vary the load from 0 to full load and measure the current, torque, and speed.
3. Stop the motor and insert three equal rotor resistance (with two different values).
4. Repeat step 2.
5. Present the torque-speed characteristics for the three cases above on the same graph.

Figure 1. Effect of changing rotor circuit resistance on the torque slip characteristic of a poly phase induction motor

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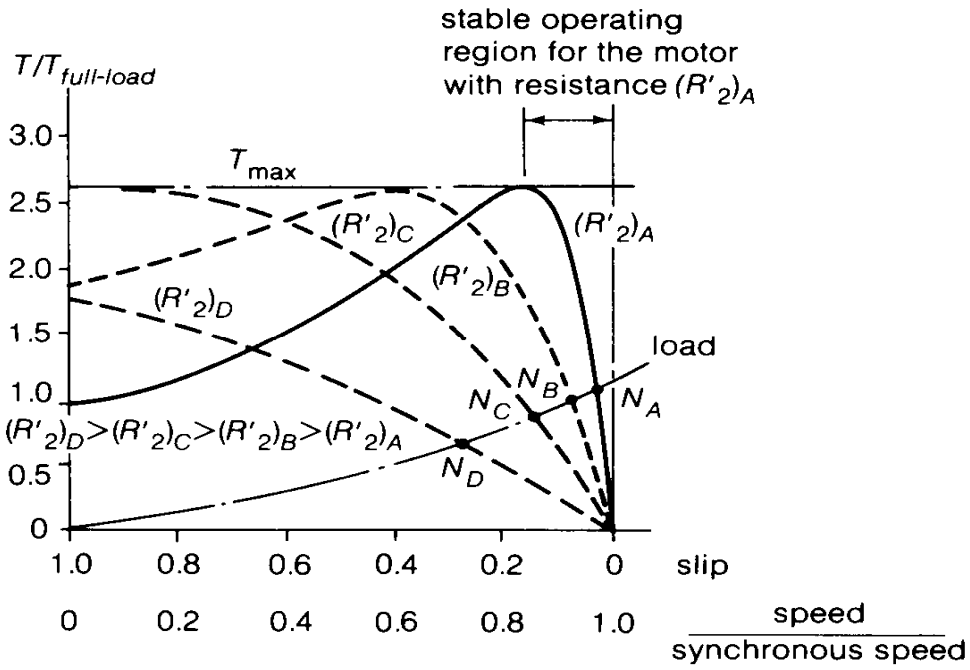

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