Experiment 6

DETERMINATION OF MOMENT OF INERTIA AND EQUIVALENT CIRCUIT PARAMETERS OF A THREE PHASE CAGED ASYNCHRONOUS MOTOR

# PURPOSE OF THE EXPERIMENT

Purpose of this experiment is to find the no-load current, no-load loss power, no-load power factor, short-circuit power loss, rated short circuit voltage, short-circuit power factor, T equivalent circuit parameters and moment of inertia of a three phase caged asynchronous motor.

# CONNECTION DIAGRAM

//Föyden al

# EXPLANATION and MEASUREMENTS

Experiment consists of three main parts, such as no-load working, short-circuited working and deceleration.

In the first part of the experiment,

-no-load current

-no-load power loss

-no-load power factor

-T equivalent circuit parameters (core loss and magnetization reactance)

In second part of the experiment,

-short-circuit power loss

-rated short circuit voltage

-short-circuit power factor

- T equivalent circuit parameters (stator and rotor winding resistances and leakage reactances)

In third part of the experiment,

-Deceleration time

-Deceleration curve

-Moment of inertia of a three phase caged asynchronous motor are measured and calculated.

The caged asynchronous motor’s rated parameters used in this experiment are following:

Nominal Voltage = 230 V

Nominal Current = 4,8 A

Nominal Speed = 1390 rpm

## No-load experıment

In this part of the experiment wiring diagram of figure 1 is used. The applied voltage to the motor is increased using an auto transformer from 100 V to 220 V by 24 V in each increment and measured current, active power, power factor and speed.

Measured values are following:

//değerler

Using the values above, we can determine the core loss and magnetization reactance.

//formüller

//formüllerde yerine koy

## Short-cırcuıt experıment

In this part of the experiment, again, wiring diagram of figure 1 is used and also rotor of the motor is blocked for not to turn using prony brake. This experiment should be done carefully because there is a risk to break motor. Using an auto transformer, voltage is increased from 0 to motor’s rated short circuit voltage. Since we didn’t know the short circuit voltage level, we constantly observed the current level of stator. When the current level reached to its rated level (4.8 A), it is obvious that the rated short circuit voltage is the applied voltage.

Applied voltage, measured current, measured power and power factor values are below:

//değerler

Using the values above, we can determine the stator and rotor (transferred to the stator side) coil resistance and stator and rotor (transferred to the stator side) leakage reactance with a small error rate.

//formüller

//yerine koy

## Deceleratıon experıment

In this part of the experiment wiring diagram of figure 2 is used. After short circuit test, prony brake is completely released and rotor can turn freely. There are numerical methods to calculate the moment of inertia but in this case physical shape of the motor is very complex. Differently from numerical methods, we can determine the moment of inertia using experimental method.

In experiment, we started the motor with rated voltage and no-load. Measured current and speed are noted. Then given voltage is cut off. Using a chronometer motor’s deceleration time is measured and using the equations below motor’s moment of inertia is calculated.

//denklemler

//yerine koy

# T EQUIVALENT CIRCUIT

//değerlere göre çizilecek

# QUESTIONS

//En sona grafikler ve bağlantı şeması

# GRAPHICS