

# ECE 331 - Homework #6

## AC Synchronous Motors

1) Assume an AC synchronous motor: 50kW, 3 phase, 2-pole, 60Hz, 240V<sub>LN</sub>, X<sub>s</sub> = 5.0 Ohms, E<sub>f</sub> = 400V.

Find the slip angle,  $\delta$ , for a load of 10kW:

2a) Write a MATLAB or SciLab program which computes the slip angle when given a load

2b) Using your MATLAB program, plot the slip angle for problem #1 as the load varies from 0kW to 50kW.

3) Write a MATLAB or SciLab program which computes the per-phase source current, I<sub>a</sub>, given the excitation voltage E<sub>f</sub> and the load in kW.

4) Assume a load of 50kW (100% load). Plot the per-phase source current, I<sub>a</sub>, and the phase of I<sub>a</sub> as the excitation voltage, E<sub>f</sub>, varies from 0V to 500V. (Voltage Load Line)

5) Assume a load of 25kW (50% load). Plot the per-phase source current, I<sub>a</sub>, and the phase of I<sub>a</sub> as the excitation voltage, E<sub>f</sub>, varies from 0V to 500V. (Voltage Load Line)

6) Assume a load of 5kW (10% load). Plot the per-phase source current, I<sub>a</sub>, and the phase of I<sub>a</sub> as the excitation voltage, E<sub>f</sub>, varies from 0V to 500V. (Voltage Load Line)

(Lab Report)

7) Give the data you collected in the lab

8) Plot the Voltage Load Line for the AC synchronous motor in the lab.