

ECE 330 HW 7

In class quiz Fri, Nov 2.

Copies of the textbook are kept at the Grainger Engineering Library Reserve

Textbook problem 4.8

Textbook problem 4.9

Textbook problem 4.12

Textbook problem 4.14 (Partial answer: $i=5$, $x=0$ (+1, -1))

Textbook problem 4.19

Special Problem #1

A single-phase rotating machine has one coil on the stator with current i_s and one coil on the rotor with current i_r . The inductances for this machine are (assume linear magnetic core): $L_{ss} = L_s$, $L_{sr} = M \cos(\theta)$, $L_{rs} = M \cos(\theta)$ and $L_{rr} = L_r$.

The machine is being operated such that the currents i_s and i_r can be assumed to be constants at I_s and I_r respectively while the shaft is rotated from with $\theta = 0$ to $\theta = \frac{\pi}{2}$. For this change from “point a” to “point b”:

1. Find the energy transferred from the mechanical system into the coupling field as the system moved from point a to point b with constant currents.
2. Find the energy transferred from the electrical system into the coupling field as the system moved from point a to point b with constant current.