ELEC 226, Spring 2009
Prof. Rich Kozick

Laboratory 3: More Transformers

Objective: We will experiment again with the transformers from Lab 2 and use the formulas for linear and ideal transformers, including the notes on limits of the linear transformer equations when the ideal transformer assumptions are applied.

Lab Activities:

1. Use the outer terminals on the secondary so that the turns ratio is expected to be $a = N_2 / N_1 = 0.1$.

2. Use a frequency of 100 Hz and characterize your transformer at this frequency. That is, estimate the internal resistances of the primary and secondary coils (R_1 and R_2), the self-inductances (L_1 and L_2), and the coefficient of coupling, k. You should be able to estimate R_1, R_2, L_1, and L_2 quickly using the procedure from Lab 2.

3. Compare the ratio L_1 / L_2 with the expected value of $[N_1 / N_2]^2 = 100$.

4. Determine how closely your transformer approximates the ideal transformer equations:
   $$\frac{\mathbf{V}_1}{N_1} = \frac{\mathbf{V}_2}{N_2}$$
   $$N_1\mathbf{I}_1 = N_2\mathbf{I}_2$$
   $$Z_{ab} = \frac{Z_L}{(N_2/N_1)^2}$$
   How does the closeness of approximation vary with frequency?

5. If you finish the previous steps, set up the circuit shown in Problem 9.82 that you analyzed on Homework 3, and compare your measured results with the analysis. Use a potentiometer for R_x.

Each lab group should prepare a one-page summary of your results and discuss it with the instructor before leaving.
Please keep your circuits assembled until you discuss the results with the instructor.