T.C

ADANA ALPARSLAN TÜRKEŞ SCIENCE AND TECHNOLOGY UNIVERSITY

FACULTY OF ENGINEERING

EEE 222 ELECTRICAL CIRCUIT LABORATORY II

2020-2021 Spring Term

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EXPERIMENT I

INTRODUCTION TO

SINUSOIDAL STEADY STATE RESPONSE (MATLAB)

EXPERIMENT 2

SINUSOIDAL STEADY STATE RESPONSE (MATLAB)

This experiment investigates the magnitude and phase of voltages in circuits. These measurements will be related with the appropriate circuit theory. Phase angles will be measured in two ways – by reading the time difference of zero-crossings in the time domain and by the Lissajous pattern method. Then, you will apply a step function to the circuit and capture the resulting waveform.

EQUIPMENT

- Waveform function generator;
- Oscilloscope;
- Computer;
- Breadboard;
- Assorted resistors inductors and capacitors.

PRELIMINARY WORK

P1

a) Calculate voltages of resistance and capacitor which is given circuit in figure 1 by hand (Both amplitude and phase) V1=10sin (5000*2*pi*t)

b) Analyze the circuit given in Figure 1 by using Simulink/MATLAB. (Attach outcomes of the program at the end of report)

c) Give information about voltage and current in terms of leading or lagging

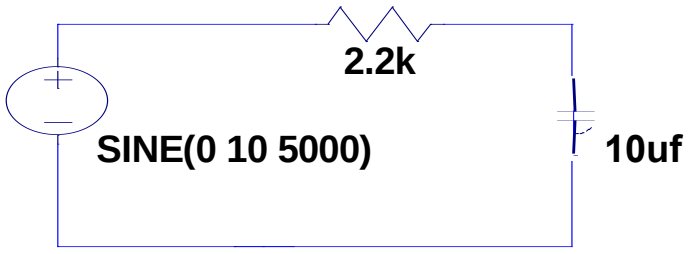

Figure 1

P2

a) Calculate voltages of resistance and capacitor which is given circuit in figure 2 by hand (Both amplitude and phase) V1=10sin (5000*2*pi*t)

b) Analyze the circuit given in Figure 1 by using Simulink/MATLAB. (Attach outcomes of the program at the end of report)

c) Give information about voltage and current in terms of leading or lagging

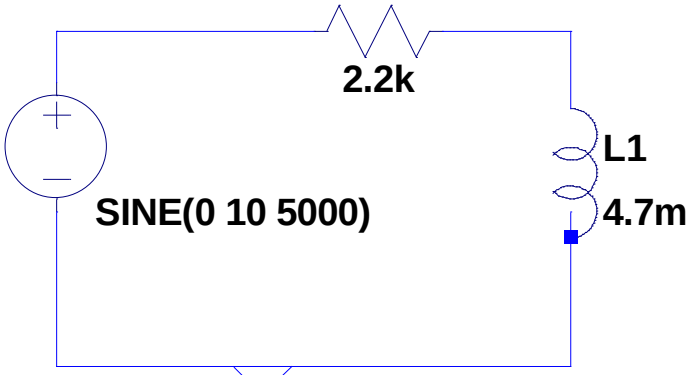

Figure 2

EXPERIMENTAL WORK

E1)

a) Using your breadboard, construct the circuit as shown in the figure 1 above. Connect the channel 1 oscilloscope probe between points A and ground, and the channel 2 probe between points B and ground. Set the frequency to 1000Hz and the peak-to-peak voltage magnitude to 8 volts centered on ground.

b) Using the oscilloscope, record the frequency and amplitude on each channel.

Channel 1: f = _____ Hz Amplitude = _____ Vpp

Channel 2: f = _____ Hz Amplitude = _____ Vpp

c) Measure the time difference between the voltage peaks and convert this number to degrees.

Time difference: t = _____ µS Degrees = _____ º

d) The voltage at point A is leading or lagging the voltage at point B.

e) Sketch the waveforms for both channels on the axis below showing the amplitude and phase.

E2) Repeat the same procedure for Figure 2 by using a 4.7 mH inductor instead of capacitor.

a) Using your breadboard, construct the circuit as shown in the figure above. Connect the channel 1 oscilloscope probe between points A and ground, and the channel 2 probe between points B and ground. Set the frequency to 1000Hz and the peak-to-peak voltage magnitude to 8 volts centered on ground.

b) Using the oscilloscope, record the frequency and amplitude on each channel.

Channel 1: f = _____ Hz Amplitude = _____ Vpp

Channel 2: f = _____ Hz Amplitude = _____ Vpp

c) Measure the time difference between the voltage peaks and convert this number to degrees.

Time difference: t = _____ µS Degrees = _____ º

d) The voltage at point A is leading or lagging the voltage at point B.

e) Sketch the waveforms for both channels on the axis below showing the amplitude and phase.

CONCLUSION

C1) Compare the experimental results with your theoretical approach which is obtained in preliminary section and simulation results. Interpret this comparison.