

ECE 209L - FOURIER SERIES - LAB 21 SPECTRUMS OF PERIODIC SIGNALS - PART II

FALL 2003

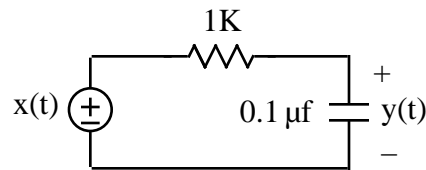
A.P. FELZER

OBJECTIVE

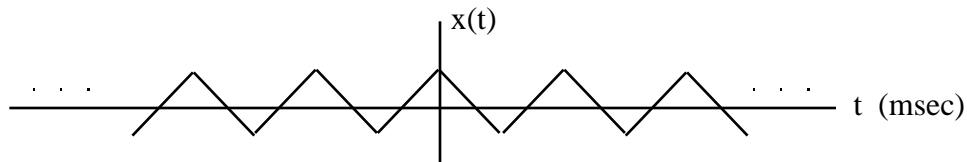
The objective of this lab is to see how the amplitude and DC offset of a periodic signal affects the amplitudes of its harmonics.

LAB

1. Given the following first order RC circuit



adjust the frequency of the following triangle train input



until $y(t)$ "pretty much" looks like the input. Sketch a picture of your $y(t)$

2. Now double the amplitude of $x(t)$ and sketch the corresponding $y(t)$. Describe how $y(t)$ changed.
3. What do you think happened to c_0 and the harmonics of the triangle train when the amplitude of $x(t)$ was doubled above. Why do you think so.
4. What do you think will happen to c_0 and the harmonics of periodic signals in general when the signals are multiplied by K .
5. Add a DC offset of two volts to your triangle train and sketch the corresponding $y(t)$ on both DC coupling and AC coupling. Describe what you see.
6. What do you think happened to c_0 and the harmonics of the triangle train when the DC offset was added in Problem (5). What makes you think so.
7. What do you think will happen to c_0 and the harmonics of periodic signals in general when a periodic signal is offset by K volts.
8. Describe what happens to the amplitude and shape of $y(t)$ as you increase the frequency of $x(t)$. Draw pictures of $y(t)$ to illustrate
9. Make use of spectral plots and frequency responses to explain why $y(t)$ changed the way it did in Problem (8)