Problems from Lecture 4

Consider a series RLC circuit with R=1 ohm, L=1 microhenry, and C=1 microfarad

(1) Calculate the resonance frequency fo and the Q neglecting R and including R.

(2) Calculate the magnitude and the phase of the complex impedance of the entire RLC circuit versus the driving frequency.

(3) Plot the magnitude of the complex impedance of each circuit element versus frequency on a single graph. Show where the resonance frequency occurs and explain why it occurs there.

(4) Consider the RLC circuit as an impedance divider with an applied input voltage of 100 volts rms. Calculate the magnitude and the phase of the voltage across each circuit element versus frequency.

(5) Calculate the magnitude and the phase of the current through the entire RLC circuit versus frequency. (this is part 4 continued)

(6) Write down the differential equation for the damped driven harmonic oscillator and that for the RLC circuit. Explain the analogy between the two.