

***Physics Department***

***Physics 112***

**Preliminary Laboratory Questions sheet**

**IMPEDANCE AND REACTANCE**

1. The resistive reactance of the resistor is R. What is the capacitive reactance,and the inductive reactance.

The capacitive reactance is $\frac{1}{ωC}$ The inductive reactance $ωL$

1. The frequency of a wave is 5000 HZ. What is the angular frequency ω of the wave.

$$ω=2πf=2π×5000=3.1×10^{4} rad /s$$

1. Draw two sinusoidal waves with phase shift equal zero.
2. Suppose that the angular frequency(ω) of the signal generator is 10000 rad/s. calculate the phase shift between the voltage on the resistor and the input voltage. in an –RLC series circuit with R=1 KΩ, L=10 mH , C=0.1 µF.

When the phase shift is zero between the current and the driving voltage in the RLC series circuit in the previous question? What is the current at this

$$Φ=tan^{-1}\left(\frac{-ωL+\frac{1}{ωC}}{R}\right)= tan^{-1}0.9=42°$$

$$I\_{0}=\frac{ε\_{0}}{\sqrt{R^{2}+(ωL-\frac{1}{LC})^{2}}}$$

$$\left(ωL-\frac{1}{LC}\right)^{2}=0 because the phase shift=0.$$

$$I\_{0}=\frac{ε\_{0}}{\sqrt{R^{2}}}=\frac{ε\_{0}}{R}=ε\_{0}×10^{-3}=ε\_{0} mA =V\_{p} mA$$