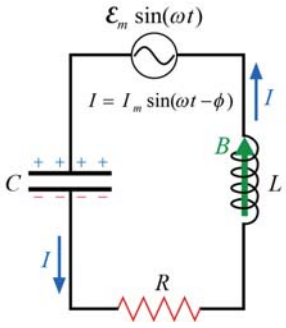
MAIN POINTS

Series *LCR* Circuit Driven by an AC Generator Sustains Oscillations

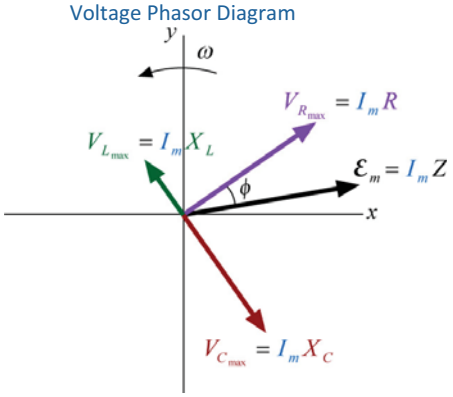
Energy supplied by a generator is dissipated by the resistor and stored in the capacitor and inductor.



Phasors

Phasors are vectors that rotate at the generator frequency and can be used to determine the current and the voltages in the circuit.

Voltage Phasor Diagram

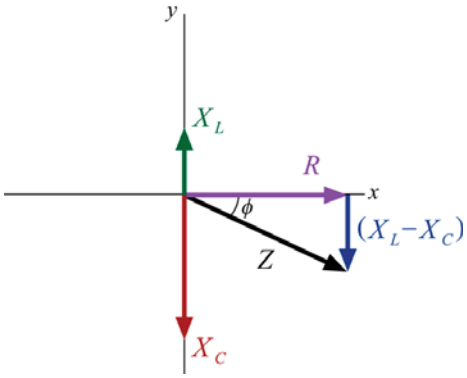


Reactances are defined to relate the maximum voltage across each element to the maximum current in the circuit.

$$X_L \equiv \omega L \qquad X_C \equiv \frac{1}{\omega C}$$

The maximum current (I_m) and the phase (ϕ) between the current and the driving voltage can be determined from the impedance triangle.

Impedance Phasor Diagram



$$\tan\phi = \frac{X_L - X_C}{R}$$

$$I_m = \frac{\mathcal{E}_m}{\sqrt{R^2 + (X_L - X_C)^2}} \equiv \frac{\mathcal{E}_m}{Z}$$