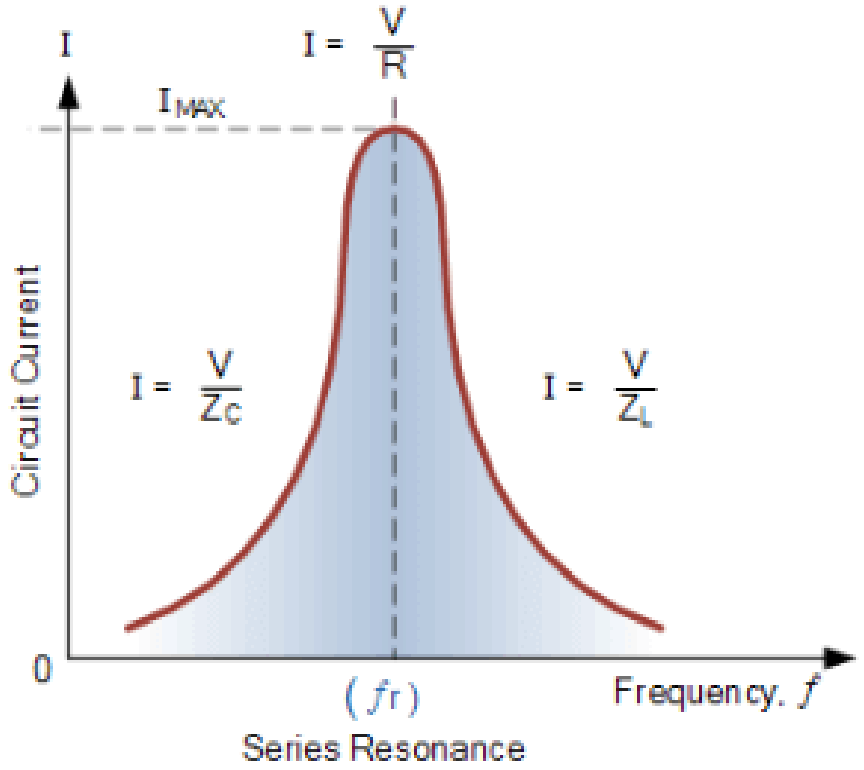
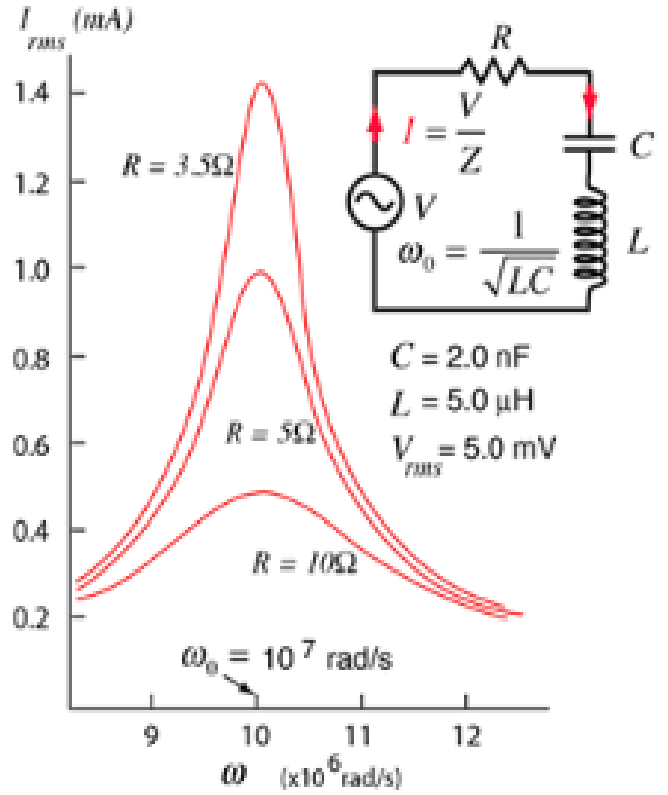
Chapter-3
(Principle of Resonance in Series Circuit)

What is the resonance in series circuit?

Series resonance is a resonance condition that usually occurs in series circuits, where the current becomes a maximum for a particular voltage. In series resonance, the current is maximum at resonant frequency. The series resonance current curve increases to a maximum at resonance then decreases as resonance is passed.

What is the Resonance in Series RLC Circuit?





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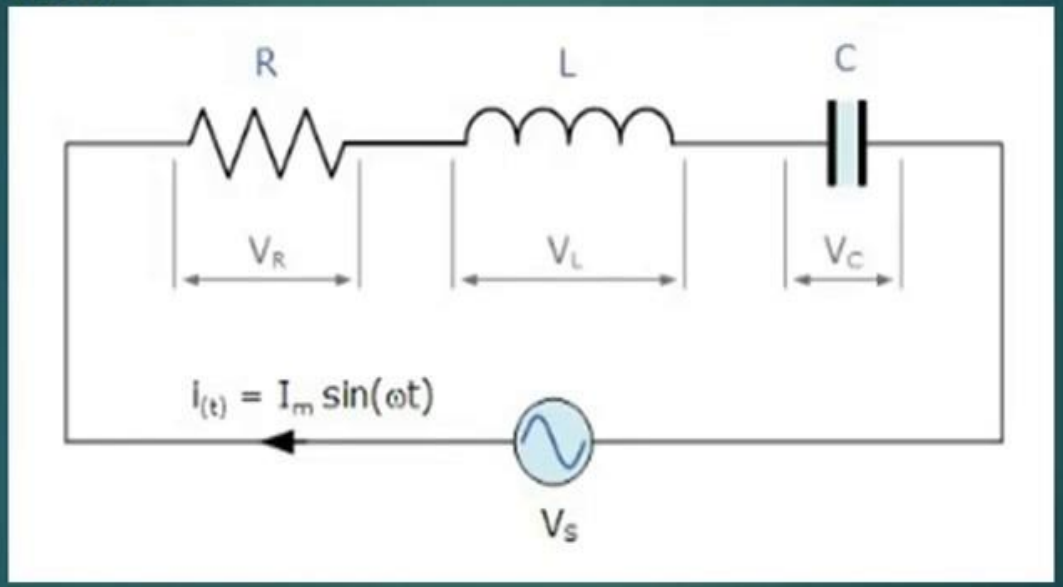
Series RLC Circuit

- When resistor, inductor and capacitor are connected in series across a voltage supply, the circuit so obtained is called series RLC circuit.



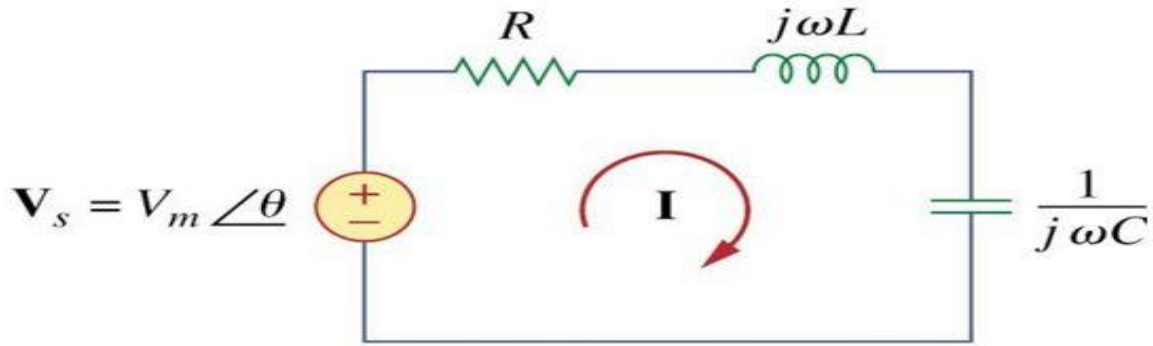
- The three basic passive components: resistance (R), inductance (L), and capacitance (C) have very different phase relationships to each other when connected to a sinusoidal AC supply.

Series Resonance

Total impedance of series RLC Circuit is

$$Z_{Total} = R + jX_L - jX_C$$

$$Z_{Total} = R + j(X_L - X_C)$$



At resonance

$$X_L = X_C$$

The impedance now reduce to

$$Z_{Total} = R$$

The current at resonance

$$I_m = \frac{V_s}{Z_{Total}} = \frac{V_m}{R}$$