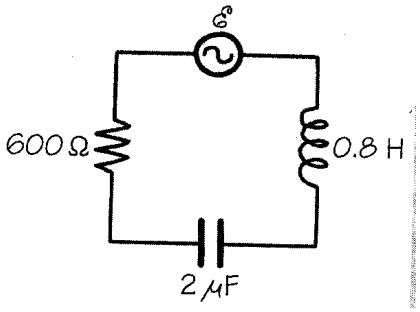
Prob34-33: Given that the maximum voltage in the circuit shown in the figure is 110 V and the frequency of oscillation is 60 Hz, calculate the maximum current and the maximum potential drops across the resistor, capacitor, and inductor.



What is the resonant angular frequency ωo of the circuit ? Suppose that the voltage generator has a variable angular frequency ω for what values of ω will the current have half the value it has at resonance?

Solution:

We know that $X_C = \frac{1}{wC}$ = 1.33 kΩ

And $X_L = wL$ = 302 Ω. And therefore $Z = \sqrt{(X_L - X_C)^2 + R^2}$ =1.2 kΩ.

The maximum current in the circuit therefore is:

$I_0 = \frac{V_0}{Z}$ =110 V/1.2 k= 92 mA.

The potential differences therefore are:

$V_{R0} = I_0.R$ = 55 V

$V_{C0} = I_0.\frac{1}{wC}$ = 123 V

and

$V_{L0} = I_0.wL$ = 28.0 V

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The answer for the last part : the required frequency is 1.7 x 10^3 rad/s.

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