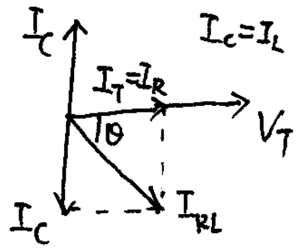
through the inductive branch I_L must be equal to the current through the capacitive branch I_C; and the total line current I_T equals the in phase component of the current through the inductive branch, or $I_T = I_R$, since the impedance is maximum, I_T is minimum.



The resonant frequency for the circuit is

$$f_r = \frac{1}{2\pi}\sqrt{\frac{1}{LC} - \frac{R^2}{L^2}}$$

where f_r = resonant frequency, Hz
L = Inductance, H
C = Capacitance, F
R = resistance, Ω.

If Q of the coil is high, say greater than 10, or $1/LC \gg R^2/L^2$, then R^2/L^2 can be disregarded.

$$\therefore f_r \approx \frac{1}{2\pi\sqrt{LC}}.$$

total impedance $\quad Z_T = L/RC.$

3. The system given has two degrees of freedom, and therefore, it also has two characteristic frequencies of vibration.

Assume: $\quad x_1(t) = Ae^{i\omega t} \qquad x_2(t) = Be^{i\omega t}.$

$$\therefore \dot{x}_1 = Ai\omega e^{i\omega t} \qquad \dot{x}_2 = Bi\omega e^{i\omega t}$$
$$\ddot{x}_1 = -A\omega^2 e^{i\omega t} \qquad \ddot{x}_2 = -B\omega^2 e^{i\omega t}$$

$$\Rightarrow \begin{cases} (-A\omega^2 m + bAi\omega + (k+k_c)A + k_cB)e^{i\omega t} = \\ (-B\omega^2 m + bBi\omega + (k+k_c)B + k_cA)e^{i\omega t} = \end{cases}$$