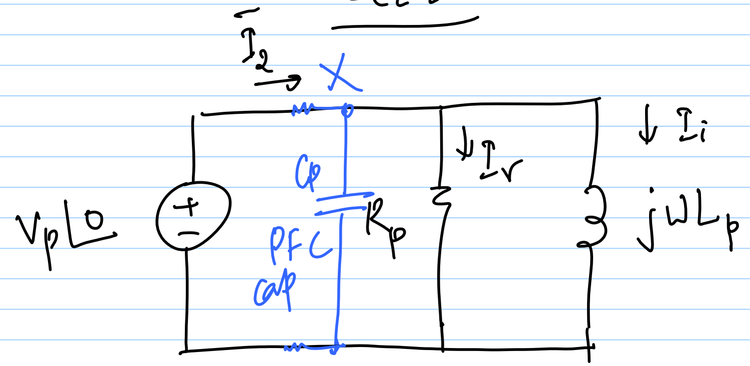
6/4/15

Lec 35



$$\bar{I} = \bar{Y} \cdot V_p \angle 0$$

$$\bar{Y} = \frac{1}{R_p} - \frac{j}{\omega L_p}$$

Case 1

no L_p (purely resistive) $\bar{V} = V_p \angle 0$

$$P_r = \frac{V_p^2}{2R_p} \quad ; \quad \bar{I}_1 = \frac{V_p \angle 0}{R_p} = I_r$$

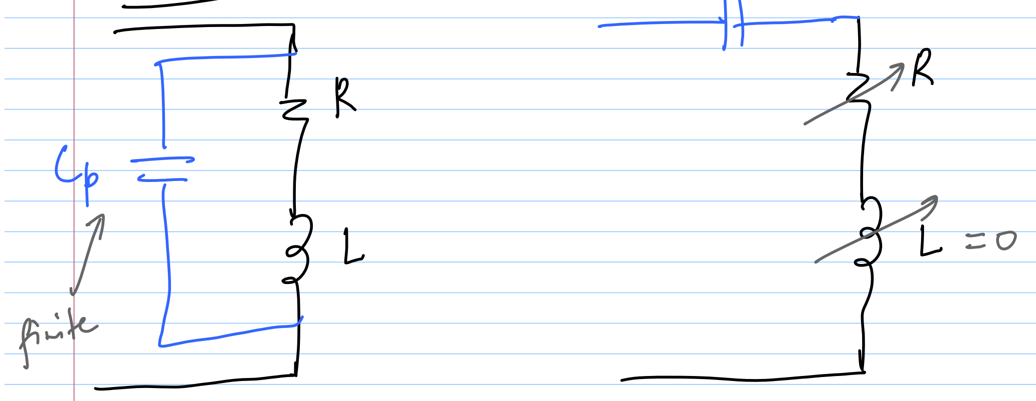
Case 2

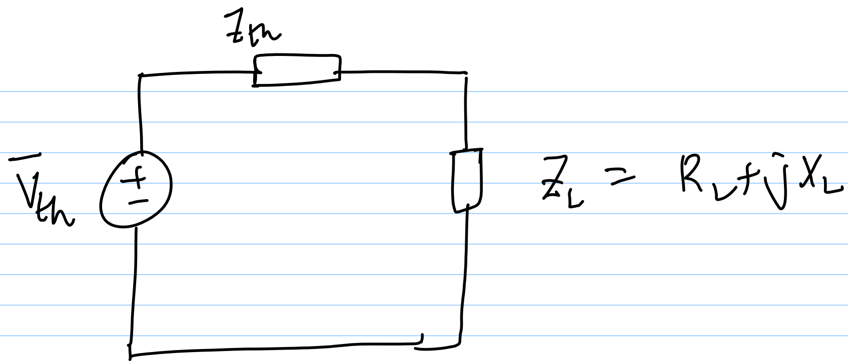
$R_p \parallel L_p$

$$P_r = \frac{V_p^2}{2R_p} \quad \left\{ \begin{array}{l} I_{R_p} = \dfrac{V_p \angle 0}{R_p} = I_r \\[2ex] I_{L_p} = \dfrac{-V_p \angle 0}{\omega L_p} = I_i \end{array} \right.$$

$$\bar{I}_2 = I_r + j I_i$$

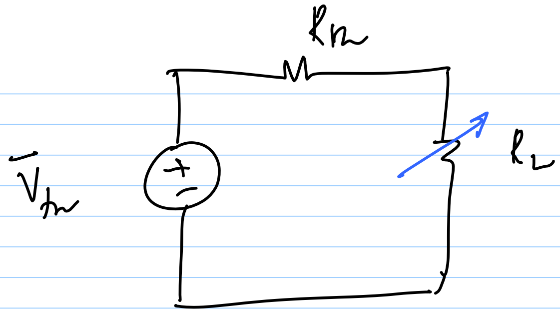
Series vs. parallel caps





Power delivered to Z_L

$$P_r = \mathrm{Re}\left[\frac{1}{2} \cdot \frac{\bar{V}_{th} \cdot Z_L}{Z_{th} + Z_L} \cdot \frac{\bar{V}_{th}^*}{Z_{th}^* + Z_L^*}\right]$$



$P_{R_L} =$

In general $P_r = V_{rms} I_{rms} \cos(\theta)$

$$= \mathrm{Re}\left[\frac{\bar{V}_L \cdot \bar{I}_L^*}{2}\right]$$

$$\bar{V}_L = \frac{R_L}{R_L + R_{th}} \cdot \bar{V}_{th} \qquad \bar{I}_L = \frac{\bar{V}_{th}}{R_{th} + R_L}$$

Power delivered to Z_L

$$P_r = \mathrm{Re}\left[\frac{1}{2} \cdot \frac{\bar{V}_{th} \cdot Z_L}{Z_{th} + Z_L} \cdot \frac{\bar{V}_{th}^*}{Z_{th}^* + Z_L^*}\right]$$

$$= \frac{|V_{th}|^2 \cdot}{2 \cdot |Z_{th} + Z_L|^2} \cdot \mathrm{Re}[Z_L]$$