



Q: Determinare  $\dot{Z}_L = R_L + jX_L$  / Potenza attiva da esso assorbita sia massima  
 $(\dot{Z}_i = R_i + jX_i)$

Se  $\dot{Z}_L = R_L + jX_L \rightarrow P_{\dot{Z}_L} = \frac{1}{2} R_L |\mathbf{I}|^2$ , siccome  $\mathbf{I} = \frac{\bar{E}}{Z_{eq}} = \frac{\bar{E}}{\dot{Z}_i + \dot{Z}_L}$

$$\Rightarrow |\mathbf{I}|^2 = \frac{E^2}{(R_L + R_i)^2 + (X_L + X_i)^2}$$

$$\begin{aligned} \dot{Z}_i + \dot{Z}_L &= R_L + jX_L + R_i + jX_i \\ &= (R_L + R_i) + (X_i + X_L)j \end{aligned}$$

AFFINCHÉ  $P$  sia massima  $X_L + X_i = 0 \Rightarrow X_i = -X_L$

$$\Rightarrow \text{Se } X_i = -X_L \rightarrow P_{\dot{Z}_L} = \frac{1}{2} R_L \cdot \frac{E^2}{(R_L + R_i)^2} = \frac{1}{2} R_L \cdot E^2 \cdot (R_L + R_i)^{-2}$$

SICCOME  $P_{\dot{Z}_L}$  è funzione di  $R_L$ , deriviamo rispetto ad  $R$

$$\begin{aligned} \Rightarrow P'_{\dot{Z}_L} &= \frac{1}{2} \frac{E^2}{(R_L + R_i)^2} + \left[ -\frac{1}{2} R_L \cdot 2 \cdot E^2 \cdot (R_L + R_i)^{-3} \right] \\ &= \frac{1}{2} E^2 \cdot \frac{(R_L + R_i)^2 - 2 R_L (R_L + R_i)}{(R_L + R_i)^4} = 0 \end{aligned}$$

$$\Rightarrow R_L + R_i - 2 R_L = 0 \Rightarrow R_i - R_L = 0 \Rightarrow R_i = R_L$$

$\Rightarrow$  Affinché la potenza sia massima,  $R_i = R_L$  e  $X_i = -X_L$

$$\Rightarrow \dot{Z}_L = \dot{Z}_i^* \text{ Ans}$$