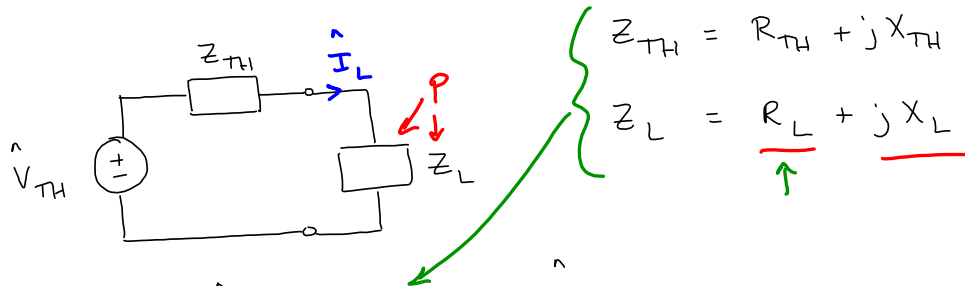


Maximum **Average** Power Transfer

$$\hat{I}_L = \frac{\hat{V}_{TH}}{Z_{TH} + Z_L} = \frac{\hat{V}_{TH}}{(R_{TH} + jX_{TH}) + (R_L + jX_L)}$$

$$\hat{I}_L = \frac{\hat{V}_{TH}}{(R_{TH} + R_L) + j(X_{TH} + X_L)}$$

$$|\hat{I}_L| = \frac{|\hat{V}_{TH}|}{|(R_{TH} + R_L) + j(X_{TH} + X_L)|}$$

\downarrow
 I_L

$$\begin{aligned} P_L &= I_{rms}^2 \cdot \text{Re}[Z_L] \\ &= I_L^2 \cdot \text{Re}[Z_L] \\ &= I_L^2 \cdot R_L \end{aligned}$$

$$P_L = \frac{|\hat{V}_{TH}|^2}{|(R_{TH} + R_L) + j(X_{TH} + X_L)|^2} \cdot R_L$$

want to maximize power

$$jX_{TH} = -jX_L$$

$$\boxed{X_{TH} = -X_L}$$

$$P_L = \frac{V_{TH}^2}{|(R_{TH} + R_L)|^2} \cdot R_L$$

$$P_L = \frac{V_{TH}^2}{(R_{TH} + R_L)^2} \cdot R_L$$

$$\boxed{R_L = R_{TH}}$$

$$Z_L = Z_{TH}^*$$