Formulas 2

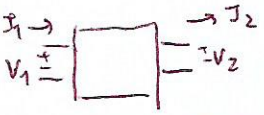
$$r = \sqrt{a^2+b^2} \qquad z = re^{i\phi} = r(\cos\phi + i\sin\phi)$$
$$\phi = \arctan\left(\frac{b}{a}\right)$$

$$\Gamma_L = \frac{Z_L - Z_0}{Z_L + Z_0}$$

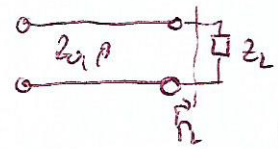
$$\Gamma(l) = \Gamma e^{-2\gamma l}$$

$$Z_{in} = Z_0 \frac{Z_L + jZ_0 \tan\beta l}{Z_0 + jZ_L \tan\beta l}$$

ABCD matrix



$$\begin{bmatrix} V_1 \\ I_1 \end{bmatrix} = \begin{bmatrix} A & B \\ C & D \end{bmatrix} \begin{bmatrix} V_2 \\ I_2 \end{bmatrix}$$



$$Z_L = Z_0 \frac{1+\Gamma_L}{1-\Gamma_L}$$

Resonators

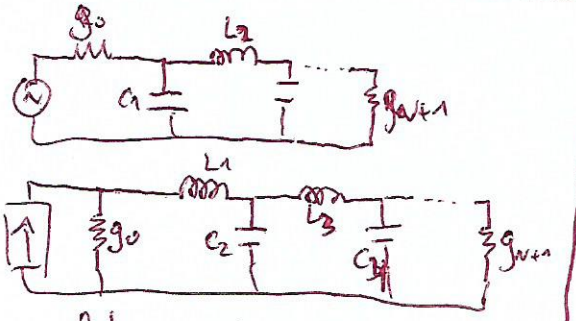
$$\omega_0 = \frac{1}{\sqrt{LC}}$$

Series: $Q_0 = \frac{1}{R}\sqrt{\frac{L}{C}}$, $Q_E = \frac{\omega_0 L}{R_L}$

Parall: $Q_0 = R\sqrt{\frac{C}{L}}$, $Q_E = \frac{R_L}{\omega_0 L}$

$$V_{out} = \frac{R_2}{R_1+R_2} V_{in}$$

$\lambda/4$ $\quad Z_{in} = \frac{Z_0^2}{Z_L}$



Scaling $\quad L' = R_0 L$

$$C' = \frac{C}{R_0}$$