**Lec 2**

**Series Resonance**

\[ Z(w_0) = R \quad Q = \frac{w_0 L}{R} = \frac{1}{w_0 CR} \]

At resonance, \( |V_L| = |V_C| = Q \cdot V_R \)

**Impedance Transformation**

\[ Z_L = \frac{Z_L - Z_0}{Z_L + Z_0} \]

- Minimize reflections
- Max power transfer \( Z_L = Z_0^* \)

**RF Impedance**

- 50 \Omega, 75 \Omega
- On-chip: small distances (lumped eq.)
- Small R loads (typical IC require power \( R \approx 7 \text{ k\Omega} \))

\[ Z_{01} = \frac{R_D \parallel Y_{01}}{j \omega C} \]

\[ Z_{in2} = \frac{1}{j \omega C} \]

\[ Z_{in2} = \frac{1}{j \omega C} \]

\[ P_{out} = \frac{|V_o \cdot j \omega L|}{R_D} \]

\[ |V_L| = |V_S| \]