Q-relation in $T_0$ & $T_1$ matches

\[ Q = w_0 \cdot \frac{\text{Energy stored}}{\text{Avg. power loss}} \]

We want to prove the relation:

\[ Q = Q_L + Q_R \]

$R_L$ is the equivalent input impedance of the right-side L-match $(L_2 - C_2)$

Power is dissipated only in $R_L$

\[ \frac{\text{Non}}{R_L} = \frac{V_i^2}{R_L} \quad \text{(1)} \]

Current through $L_1$ & $L_2 = \frac{V_i}{R_L}$ \quad \text{(2)}

From (1) & (2)

\[ Q = w_0 \cdot \frac{\frac{1}{2} (L_1 + L_2) \left(\frac{V_i}{R_L}\right)^2}{\frac{1}{2} \frac{\text{Non}}{R_L}} \]

\[ = w_0 \cdot \frac{L_1 + L_2}{R_L} \cdot \frac{V_i^2}{R_L} \]

\[ = w_0 \cdot \frac{(L_1 + L_2) \cdot \frac{V_i^2}{R_L}}{R_L} = Q_L + Q_R \]