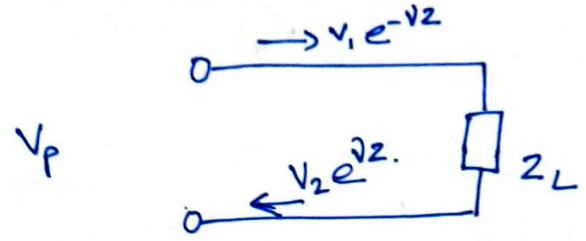
## Transmission coefficients:-

### 1) Reflection coefficient:-




Reflection coefficient defined as the ratio of reflected voltage & the incident voltage it is denoted by $\rho$.

$$\rho = \frac{V_r}{V_i}$$

$$= \frac{V_2 e^{\gamma_2}}{V_1 e^{-\gamma_2}}$$

$$= \left(\frac{V_2}{V_1}\right) e^{2\gamma_2}.$$

$$V_L = V_1 e^{-\gamma_2} + V_2 e^{\gamma_2}$$

$$I_L = \frac{1}{Z_0}\left(V_1 e^{-\gamma_2} - V_2 e^{\gamma_2}\right)$$

load Impedance

$$Z_L = \frac{V_L}{I_L} = \frac{V_1 e^{-\gamma_2} + V_2 e^{\gamma_2}}{\frac{1}{Z_0}\left(V_1 e^{-\gamma_2} - V_2 e^{\gamma_2}\right)}$$

$$= Z_0 \left[\frac{V_1 e^{-\gamma_2} + V_2 e^{\gamma_2}}{V_1 e^{-\gamma_2} - V_2 e^{\gamma_2}}\right]$$

$$= Z_0 \left[1 + \gamma_2\right]$$

By deviding denominator & numerator by $V_1 e^{-\gamma_2}$

$$= Z_0 \left[ \frac{1 + \frac{V_2}{V_1} e^{2\gamma_2}}{1 - \frac{V_2}{V_1} e^{2\gamma_2}} \right]$$

$$Z_L = Z_0 \left[ \frac{1 + |\rho|}{1 - |\rho|} \right]$$

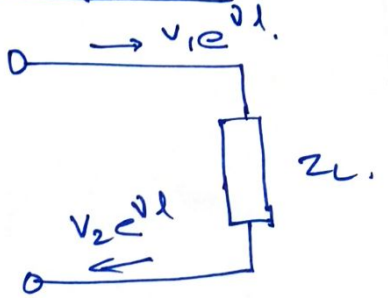
$$\boxed{\rho = \frac{Z_L - Z_0}{Z_L + Z_0}}$$

If $Z_L = Z_0$

then $\rho = 0$.

Transmittance

Transmission coefficient :-




Transmission coefficient is defined as the ratio of transmitted signal & incident signal.

$$\text{Transmitted signal} = V_1 e^{-\gamma l} - V_2 e^{\gamma l}$$

$$\text{Incident signal} = V_1 e^{-\gamma l}$$

$$\text{Transmission coefficient} = \frac{\text{transmitted signal}}{\text{incident signal}}$$

$$= \frac{V_1 e^{-\gamma l} - V_2 e^{\gamma l}}{V_1 e^{-\gamma l}}$$

$I(s) = \frac{V}{s(R_L + s)}$

Is

$= 1 - \frac{V_2}{V_1} e^{2\gamma l}$

$= 1 - \rho \quad \left[\because \rho = \frac{V_2}{V_1} e^{2\gamma l}\right]$

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

$$\boxed{\sigma = \frac{2Z}{Z_L + Z_0}}$$