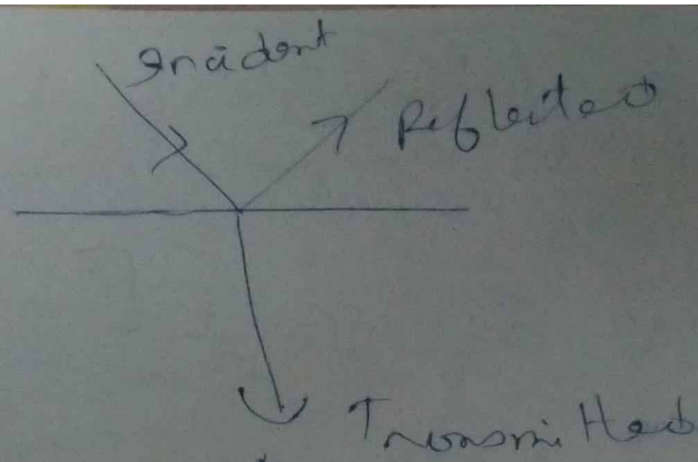
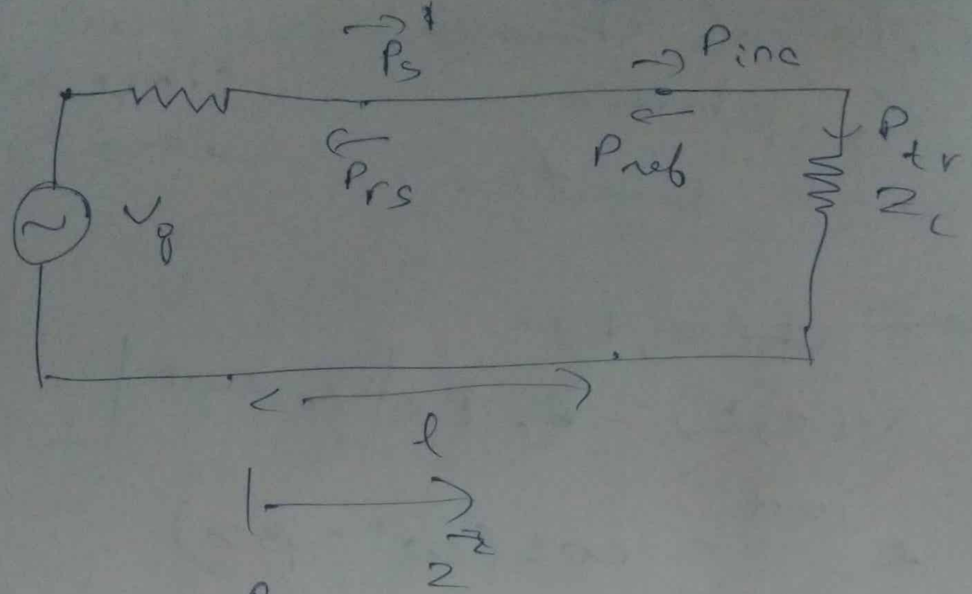




$$\cancel{\frac{P_{tr}}{P_{inc}}}$$

$$V = V_+ e^{-\gamma l} + V_- e^{\gamma l}$$

$$I = I_+ e^{-\gamma l} - I_- e^{\gamma l}$$

$$T = \frac{V_{tr}}{V_{inc}} \neq \cancel{\frac{V_+ e^{-\gamma l}}{V_+ e^{-\gamma l} + V_- e^{\gamma l}}}$$

$$\cancel{= \frac{V_+ e^{-\gamma l} - V_- e^{+\gamma l}}{V_{inc} \quad V_+ e^{-\gamma l}}}$$

$$= \frac{I_{tr}}{I_{inc}}$$

$$V_{tr}\, e^{-\gamma l} = V_+ e^{-\gamma l} + V_- e^{\gamma l}$$

$$I = \frac{1}{Z_0}\left(V_+ e^{-\gamma l} - V_- e^{\gamma l}\right)$$

$$I_{tr}\, e^{-\gamma l} = \frac{1}{Z_0}\left(V_+ e^{-\gamma l} - V_- e^{\gamma l}\right)$$

$$\frac{V_{tr}}{Z_l} e^{-\gamma l} = \frac{1}{Z_0}\left(V_+ e^{-\gamma l} - V_- e^{\gamma l}\right)$$

$$\overline{\phantom{V_+ e^{-\gamma l}}}$$

$$V_+ e^{-\gamma l}$$

$$T = \frac{2Z_l}{Z_0 + Z_l}$$

In a transmission line, $Z_0 = 75 + j0.01\ \Omega$

& $Z_L = 70 + j50\ \Omega$

i) reflection cofficient

ii) transmission coefficient

iii) Verify relation between Γ & T

$\cancel{140}$

$\cancel{145}$

i)

$$\frac{75 + j0.01 - 70 - j50}{145 + j50.01}$$

$$= \frac{-5 + j49.99}{145 + j50.01}$$

$$\frac{2Z_0}{Z_0 + Z_0}$$

$$\frac{150 + j0.02}{145 + j50.01}$$

$T = 1 + \Gamma$

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

$$T = \frac{2Z_0}{Z_0 + Z_L}$$

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

$= 1 + \Gamma$

$(145)^2 +$

$(50.01)^2$

$=$

$21025 + \cancel{2501.00}$

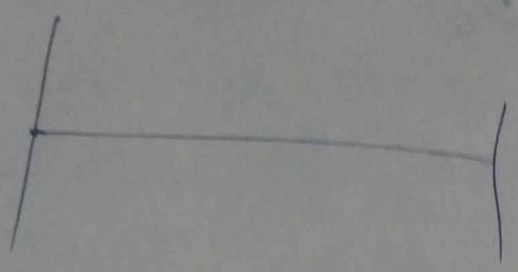
2501.0001

$= (23526.0001)$

$$\frac{(-5 + 49.99j)(145 + j50.081)}{(23526.0001)}$$

Z_L 2

Standing Wave (V_s)



$V = V_+ e^{-\gamma z} + V_- e^{\gamma z}$

(Voltage expression of T_x)

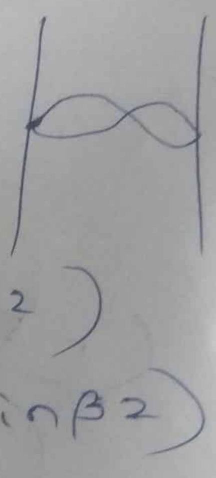
$\gamma = \alpha + j\beta$

$V_+ e^{-(\alpha - j\beta) z} + V_- e^{(\alpha + j\beta) z}$

$= V_+ e^{-\alpha z - j\beta z} + V_- e^{\alpha z + j\beta z}$

Let $V_+ e^{-\alpha z} = A$

$V_- e^{\alpha z} = B$



$\cancel{V_+ e}$

$V_+ \sin(\cos\beta z - j\sin\beta z)$

$+ V_-(\cos\beta z + j\sin\beta z)$

$= \cancel{V_+ \cos\beta z}$

$(V_+ + V_-)\cos\beta z + j(V_+ - V_-)\sin\beta z$

$= A[\cos\beta z - j\sin\beta z] +$
$B[\cos\beta z + j\sin\beta z]$

$= \sqrt{(A+B)^2\cos^2\beta z + (A-B)^2 \sin^2\beta z}$

$\frac{V_s}{V_0}$

$V_s = V_s = V_0 e^{-j\varphi}$

So V_s $\phi = \beta z$

V_0

$A+B$

~~A++~~

$\varphi = \tan^{-1}\left(\frac{(A-B)\sin\beta z}{(A+B)\cos\beta z}\right)$

$\Rightarrow \varphi = \tan^{-1}\left(\frac{A-B}{A+B}\tan\beta z\right)$

or $\arctan(b/a)$

$= \tan^{-1}\left(\frac{V_+ e^{-\alpha z} - V_- e^{\alpha z}}{V_+ e^{-\alpha z} + V_- e^{+\alpha z}} \tan\beta z\right)$

$\cos a \cos \sin b \sqrt{a^2+b^2} \sin$

~~sin~~ $a \cos b$ $a\cos b +$
$b\sin b$

$\sqrt{\quad}$

$$\sqrt{A^2 + B^2 + 2AB(\cos^2\beta z - \sin^2\beta z)}$$

$$= \sqrt{A^2 + B^2 + 2AB\cos 2\beta z}$$

$A + B$

$$\frac{dV_0}{\cancel{d(\beta} \; dz}$$

$$\frac{-\cancel{4}^{2} AB \sin 2\beta z}{\cancel{2}\sqrt{A^2+B^2+2AB\cos 2\beta z}}$$

$$= -2AB \sin 2\beta z$$

$$V_{max} = V_+ e^{-\alpha z} + V_- e^{\alpha z}$$

$$= V_+ e^{-\alpha z}(1 + |\Gamma|)$$

$$V_{min} = V_+ e^{-\alpha z} - V_- e^{\alpha z}$$

$$= V_+ e^{-\alpha z}(1 - |\Gamma|)$$

$V_{SWR} =$

Voltage standing wave ratio

$$= \frac{|V_{max}|}{|V_{min}|}$$

$$= \frac{|1+|\Gamma||}{|1-|\Gamma||}$$

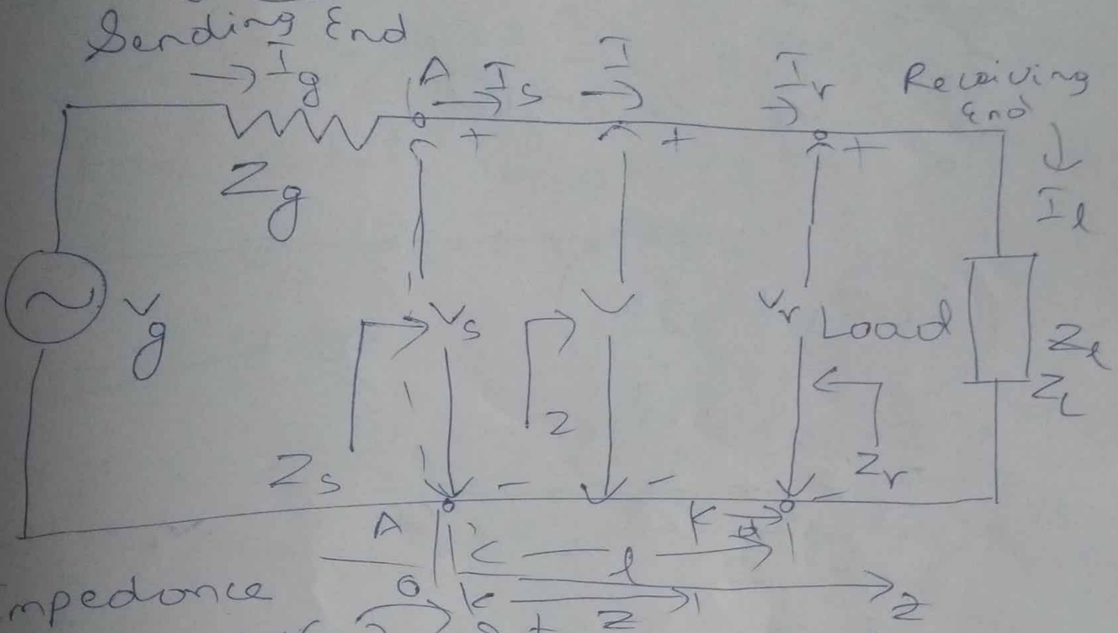
S	A	B	C_{in}
	0	0	0
	0	0	

BC_{in}
$+ AC_{in}$
$+ AB$

$\bar{A}$ B C

Cyber: Relating or Characteristics of the culture of

Line Impedance of Transmission Line



Line Impedance

$$Z = \frac{V(z)}{I(z)} \quad \text{— ①}$$

z means distance

~~V = V~~$_{inc}$

$$V = V_+ e^{-\gamma z} + V_- e^{+\gamma z} \quad \text{— ②}$$

$$I = \frac{I_+}{+}\frac{1}{Z_0}\left(V_+ e^{-\gamma z} - V_- e^{+\gamma z}\right) \quad \text{— ③}$$

$$= Y_0\left(V_+ e^{-\gamma z} - V_- e^{\gamma z}\right)$$

~~Character~~
Characteristic Admittance

At source, $z = 0$

~~$V_s = V_+ + V_-$~~
~~$I_s = Y_0(V_+ - V_-)$~~

$V_s = I_s Z_s = V_+ + V_-$
$I_s = Y_0(V_+ - V_-)$

$\cancel{7}$

V

$V_+ + V_- = V_s$

$\cancel{V_+ - V_- = Y_0 I_s Z_s}$

$I_s Z_s = V_+ + V_- \quad — (4)$

$\frac{I_s}{Y_0} = V_+ - V_- \quad — (5)$

$\left(I_s Z_s + \frac{I_s}{Y_0} \right)$

$\frac{I_s Z_s + I_s Z_0}{2} = V_+$

$V_+ = \frac{I_s}{2}(Z_s + Z_0) \quad (6)$

$\frac{I_s Z_s - I_s Z_0}{2} = V_-$

$V_- = \frac{I_s}{2}(Z_s - Z_0) \quad (7)$

$\frac{V_s + I_s Z_0}{2} = V_+$

$\frac{V_s - I_s Z_0}{2} = V_-$

$V_a = \frac{I_s}{2}(Z_s + Z_0)e^{-\gamma z} + \frac{I_s}{2}(Z_s - Z_0)e^{+\gamma z}$

$I = \frac{1}{Z_0}\frac{I_s}{2}\left((Z_s + Z_0)e^{-\gamma z} - (Z_s - Z_0)e^{\gamma z}\right)$

So line impedance in terms of source and is

$$= \frac{(Z_s + Z_0)e^{-\gamma z} + (Z_s - Z_0)e^{\gamma z}}{(\cancel{Z_0} Z_s + Z_0)e^{-\gamma z} - (Z_s - Z_0)e^{\gamma z}} Z_0$$

$$V = V_+ e^{-\gamma z} + V_- e^{\gamma z}$$

$$I = \frac{1}{Z_0}(Z V_+ e^{-\gamma z} - V_- e^{\gamma z})$$

For total length (l),

$$\cancel{Z = Z_0 (Z_s + Z_0) e^{-\gamma l} +}$$

$$\cancel{Z = Z_0 (Z}$$

$$Z = Z_0 \frac{(Z_s + Z_0)e^{-\gamma l} + (Z_s - Z_0)e^{\gamma l}}{(Z_s + Z_0)e^{-\gamma l} - (Z_s - Z_0)e^{\gamma l}}$$

At any point $z\ d$

$$Z = Z_0 \frac{(Z_s + Z_0)e^{-\gamma(l-d)} + (Z_s - Z_0)e^{\gamma(l-d)}}{(Z_s + Z_0)e^{-\gamma(l-d)} + (Z_s - Z_0)e^{\gamma(l-d)}}$$

$$=$$

$$Z = Z_0 \frac{\cancel{2} Z_s}{\cancel{2} \cancel{Z_0}}$$

$$= Z_s$$

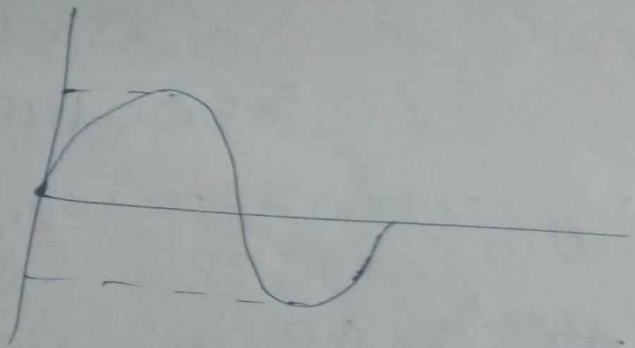
Virus is an active malware software & worm is also that.

N

Normalized impedance (It look like relative refractive index)

It is ratio of simple impedance by characteristic impedance

So, $z = \frac{Z}{Z_0} = \frac{1+\Gamma}{1-\Gamma}$



$z_{max} = \frac{1+|\Gamma|}{1-|\Gamma|}$

$z_{min} = \frac{1-|\Gamma|}{1+|\Gamma|}$

$= \frac{1}{\rho_{VSWR}}$

This is got by the above sine curve.

For max, $\Gamma > 0$

& for min $\Gamma < 0$.

Smith Chart:

$$\Gamma_l = \frac{Z_l - Z_0}{Z_l + Z_0}$$

$$\cancel{\Gamma_d = \Gamma_{l-d} \quad \Gamma_l e^{-j\gamma d}}$$

$$\Gamma_d = \Gamma_l e^{j2\gamma d}$$

$$= \Gamma_l e^{j2(\alpha + j\beta)d}$$

~~fo~~
... follow graph