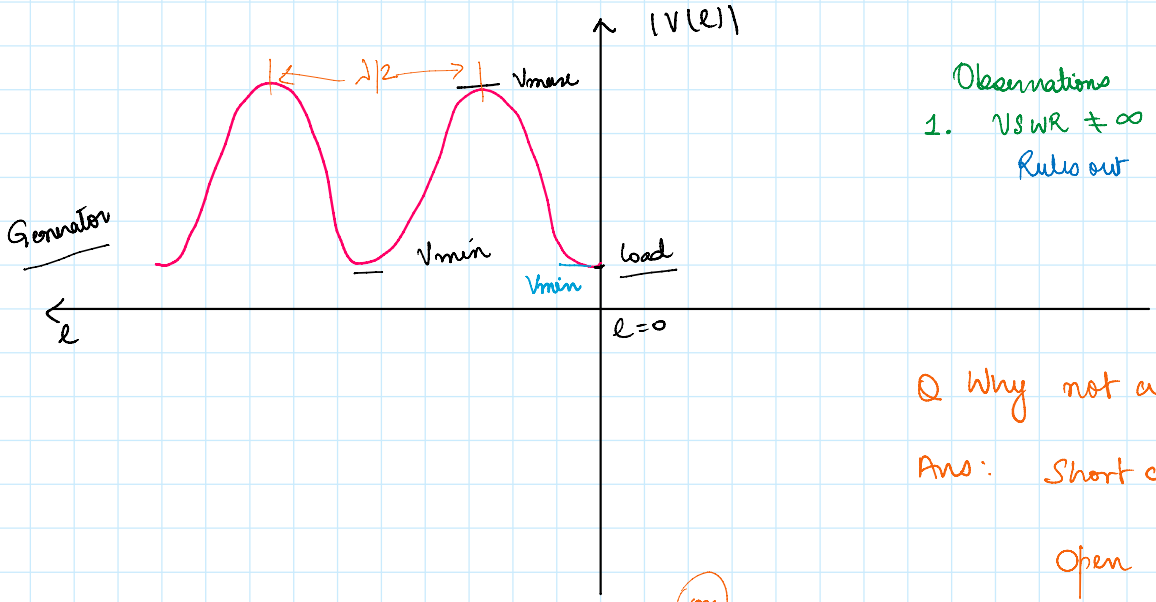
Lec-23

Friday, May 22, 2020 8:21 AM

- HW #4 is due today
- Midterm2 - Wed 27th
- Lec - 12 to Lec 21

Midterm-2 Review

VSWR



Observations

1. VSWR $\neq \infty$; $|\Gamma_L| < 1$

   Rules out Short, open, pure L & pure C loads.

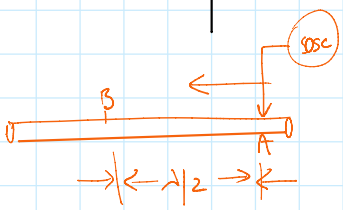
Q Why not a short circuit?

Ans: Short circuit $\Gamma_L = -1$

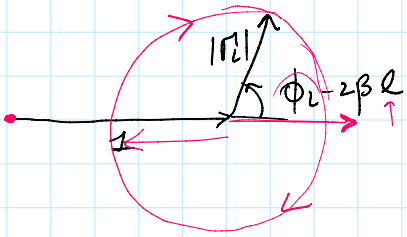
Open circuit $\Gamma_L = 1$

Pure L load $|\Gamma_L| = ? 1$

Pure C load $|\Gamma_L| = 1$



- When $|\Gamma_L| < 1 \Rightarrow$ Some energy was absorbed at the load. $\Rightarrow$ Resistance is present at the load end
- This does not rule out the presence of inductance & capacitance in series with the resistance.

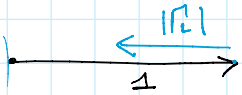


Γ_L

- After observing the magnitude of $|V(\ell)|$ at $\ell = 0$, we can rule out inductance & capacitance in series because $\angle \Gamma_L = 180°$

Q Why $\angle \Gamma_L = 180°$?

@ $\ell = 0$ we are getting Vmin



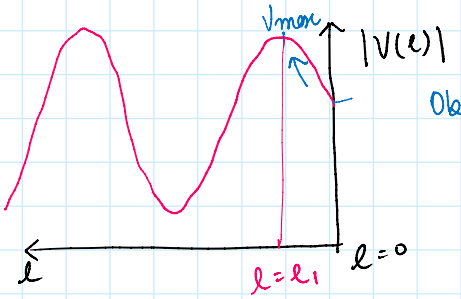
Γ_L is negative

$\Gamma_L < 0$

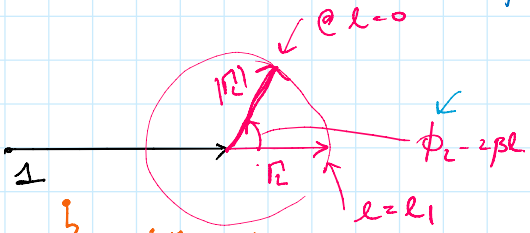
Q What R can make $\Gamma_L < 0$

Ans: $R_L < Z_0 \Rightarrow \Gamma_L < 0$

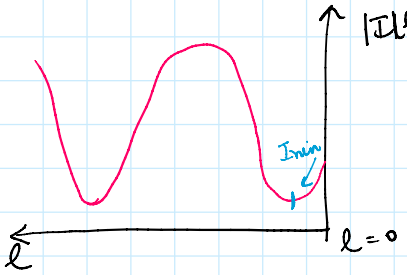
Q How to know the angle of Γ_L at $\ell = 0$ from VSWR?



Observation: Starting from load towards generator, we first hit Vmax.



$\phi_L - 2\beta\ell$



$|I(\ell)| \Rightarrow$ We are looking at

$\rightarrow \angle\Gamma_L \rightarrow$ from $-\pi$ to π

$\rightarrow$ VSWR $\neq \infty$

Load $= Z_L \longrightarrow a + ib$

Char Impedance $= Z_0 \rightarrow$ Real

$$\Gamma_L = \frac{a+ib-Z_0}{a+ib+Z_0} = \frac{r_1 e^{j\theta_1}}{r_2 e^{j\theta_2}}$$

$$\phi_L = \angle\Gamma_L = \theta_1 - \theta_2$$

$$\theta_1 = \tan^{-1}\left(\frac{b}{a-Z_0}\right)$$

$$\theta_2 = \tan^{-1}\left(\frac{b}{a+Z_0}\right)$$