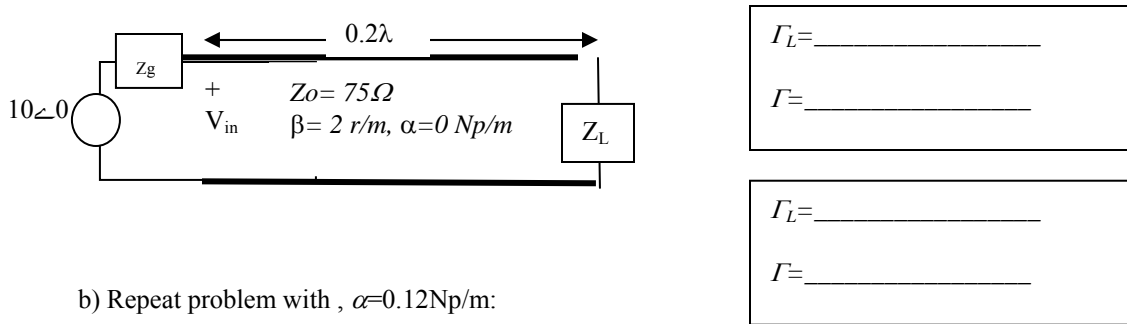


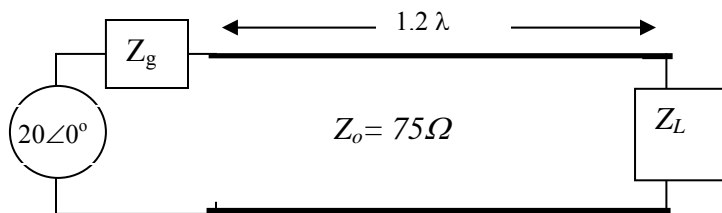
1. For the following circuit, find the voltage reflection coefficient at a distance of 0.2 wavelength from the load of $25-j50 \Omega$. Line is not matched to the source or load.



b) Repeat problem with , $\alpha=0.12\text{Np/m}$:

2. [20pts] For the following circuit, the lossless line is connected to a load of $50+j25\Omega$, and the load voltage is $8\angle 50^\circ \text{ V}$. The line is 1.2 wavelengths long. (The source is NOT matched to the line or the load.)

- a) [10 pts] Find V_o^+
- b) [10 pts] Find the sending end voltage V_{in} .



3. Reflections are measured at the input terminals of an antenna. The reflection coefficient is found to be $0.7\angle 30^\circ$, find the corresponding impedance if connected to a 100 ohm coaxial line using the Smith Chart.

1. Un radar montado en un avión se usa para estudiar el capas de hielo glacial para determinar la edad del mismo, transmite una onda plana con campo eléctrico

$$E_i = (4\hat{a}_x - 3\hat{a}_z) \cos(\omega t - 3x - 4z) \quad \text{V/m}$$

Presumiendo que el hielo ($\epsilon_r=9$ está en el plano $z \geq 0$ y no tiene pérdidas. (el hielo no es un material magnético.)

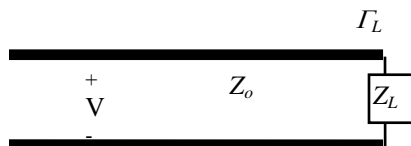
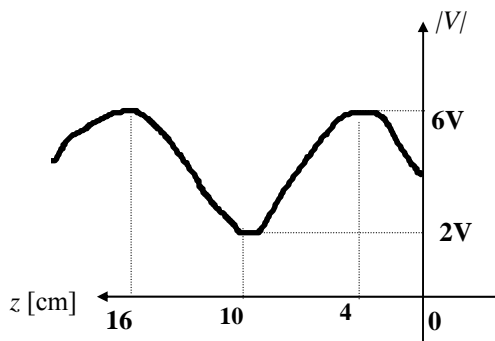
- (a) Halle k_i y si la polarización de incidencia es || o perpendicular.
- (b) Halle $\theta_i, \theta_t, \Gamma$:
- (c) Halle el coeficiente de reflexión.
- (d) la constante de fase en el aire
- (e) la frecuencia de la onda
- (f) la constante de fase en el hielo
- (g) el campo reflejado

4. Two vertically polarized dipole antennas are separated by 0.5 km over (lossless) earth with relative permittivity of 30. Both antennas are to be at the same height above ground. At what height h should the two antennas be located so that there is no ground reflection from the point on the ground midway between the two antennas. (The polarization of the E field is the same as the antennas). The earth is a non-magnetic material.



5. [20pts] The figure below shows a lossless 90Ω transmission line that is terminated with an unknown impedance and the magnitude of the voltage measured by a slotted line is shown in the plot.

Calculate the voltage standing wave ratio (VSWR or s), the wavelength λ , and the load impedance Z_L .
Use the Smith Chart.



$s =$ _____ [5 pts]
$\lambda =$ _____ [5 pts]
$Z_L =$ _____ [10 pts]