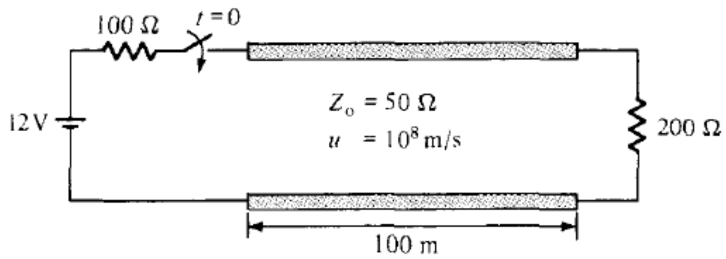
LE 325 Assignment #6

1. For the transmission line of the figure below, calculate and sketch

(a) The voltage at the load and generator ends for $0 < t < 6$ μs

(b) The current at the load and generator ends for $0 < t < 6$ μs

Also draw the bounce diagrams for this transmission line.



2. Repeat problem 1 if the transmission line is

(a) short-circuited

(b) open-circuited

Do only the voltage part.

3. A 75-Ω transmission line of length 60 m is terminated by a 100-Ω load. If a rectangular pulse of width 5 μs and magnitude 4 V is sent out by the generator connected to the line, and take $Z_g = 25\ \Omega$ and $u = 0.1c$, where c denotes the speed of light in free space.

(a) Sketch v on the line at $t = 7$ and 10 μs.

(b) Sketch $i(0,t)$ and $v(\ell, t)$ for $0 < t < 15$ μs.

4. Find the ABCD matrix of a transmission line of length ℓ with characteristic impedance Z_0. Then use this matrix to derive the input impedance when the line is connected to a load impedance Z_L.

5. Find the symmetrical T-section that is equivalent to the transmission line in problem 4. (HINT: compare the ABCD matrix of two networks)

6. A load impedance $Z_L = 100 + j50\ \Omega$ is connected to a transmission line of length $\lambda/8$ with characteristic impedance $Z_0 = 50\ \Omega$.

a) Calculate the input impedance.

b) Use the Smith chart to find the input impedance.

c) Find the length of the line such that the input impedance becomes real from the input impedance formula and by using the Smith chart.