HW 4 EE 407 Dr Sheikh Sharif Iqbal

Question 1: A transmission line has a characteristic impedance of 300 Ω and is terminated in a load of 300-j300 Ω. The propagation constant of the line is 0.054+j3.53 per meter. Using the given equations to calculate the following parameters;

(a) The Reflection coefficient at the load

(Answer: 0.446∠-63.43°)

(b) The Transmission coefficient at the load

(Answer: 1.26∠-18.43°)

(c) The Reflection coefficient at a point 2m away from the load

(Answer: 0.36∠-152.15°)

Question 2: Verify the answers using solutions obtained from Smith Chart.

Question 3: A coaxial line with a polyethylene dielectric (ε_r=2.25) is to be used at a frequency of 3 Ghz and is terminated in a load of 50 Ω. Assume its characteristics impedance is 50 Ω, attenuation constant is 0.0156 Np/m and phase velocity is 2x10 m/s. If the generator with open-circuit voltage of 50 v (rms) and internal impdance of 50 is used to supply a 3 GHz signal to the coaxial line, then find the following;

(a) The Magnitude of sending-end and receiving-end (load) voltages

(Answer: 25 v (rms) & 5.25 v (rms))

(b) The sending-end power and receiving-end power

(Answer:12.5 watt and 0.55 watt)

(c) The Wavelength within the coaxial cable

(Answer: 66 mm)

Question 4: A lossless transmission line (TL_1) has a characteristic impedance of 300 Ω and is operated at a frequency of 10 GHz. After a resistive load R_L is used to terminate the line the observed standing-wave ration is found to be 5.0. It is proposed to use a "segment of same transmission line (TL_T)" with Z_{0m}=50 Ω and a short-circuited stub with Z_{0s}=50 Ω to match the load with the transmission line (TL_1). Determine;

(a) Draw the figure

(b) The value of the load R_L

(Answer: 518.18 Ω)

(c) The length of the Transmission line segment (TL_T)

(Answer: 0.552 cm or 0.948 cm)

(c) The length of the S/C Stub (TL_T)

(Answer: 0.24 cm or 1.26 cm)