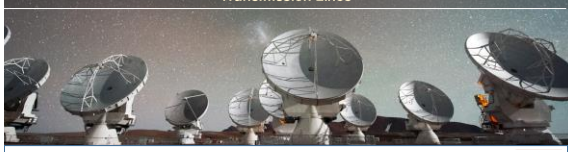
Microwave Techniques

Transmission Lines



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Exercise 1

The reflection coefficient at the load of a terminated lossless line is given as

$$\Gamma_L = 0.75\angle 60°.$$

Calculate the distance from the load to the first current minimum when $\lambda = 30$ cm. Is there a current maximum between minimum and the load?

Exercise 2

A 100 Ω lossless line is terminated in a pure resistance. What are the two possible values of load resistance if 25 percent of the incident power is reflected?

Exercise 3

Load impedance with a return loss of 6 dB is connected to a lossless line. Calculate the SWR on the line. Repeat for a return loss of 20 dB.

Exercise 4

A 75 Ω coaxial transmission line has a length of 2.0 cm and is terminated with a load impedance of 37.5 + j75 Ω. If the relative permittivity of the line is 2.56 and the frequency is 3.0 GHz, find the input impedance to the line, the reflection coefficient at the load, the reflection coefficient at the input, and the SWR on the line.

Exercise 5

A terminated transmission line with $Z_0 = 60\ \Omega$ has a reflection coefficient at the load of $\Gamma_L = 0.4\angle 60°$.

(a) What is the load impedance?

(b) What is the reflection coefficient 0.3λ away from the load?

(c) What is the input impedance at this point?

In-class 1

Use the Smith chart to find the following quantities for the transmission line circuit shown in the accompanying figure:

(a) The SWR on the line.

(b) The reflection coefficient at the load.

(c) The input impedance of the line.

(d) The load admittance and the input admittance.

(e) The distance from the load to the first voltage minimum.

(f) The distance from the load to the first voltage maximum.