Exercise 11.1

We consider a transmission line setup where the load ZL consists of 95 Ω in series with 24 pF. The characteristic impedance of the cable is 50 Ω, and it is lossless. The frequency is 100 MHz.

In this exercise, we need to determine the standing wave curve for the current. We assume the incident current wave is 1 A (peak).

a. Calculate the load impedance and express it in rectangular form.

b. Calculate KL and express it in polar form.

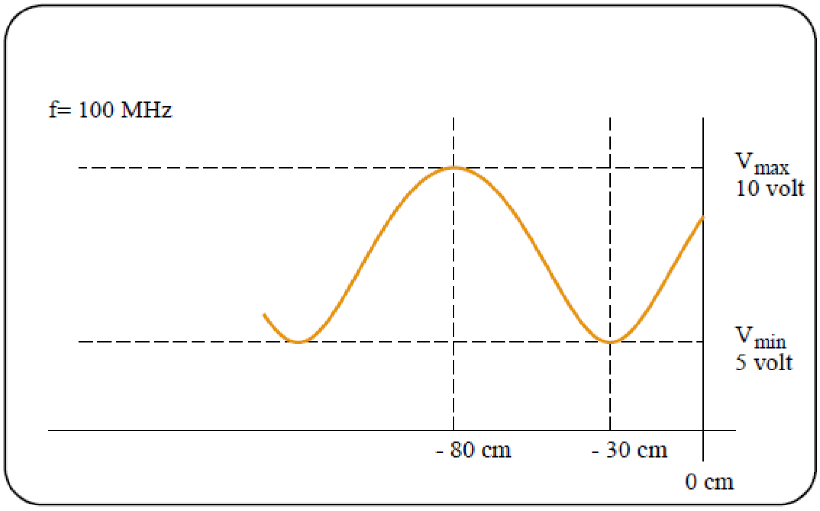
c. Calculate the maximum and minimum currents on the cable.

d. Calculate the current through ZL.

e. Calculate the distance from the load to the first current maximum, given in "wavelengths," and sketch the standing wave curve from the load to half a wavelength towards the generator.

Exercise 11.2

On a lossless cable with a characteristic impedance of 50 Ω, the following standing wave curve for voltage has been measured. The distance from the load to the first voltage minimum is 30 cm, and the distance from the load to the first voltage maximum is 80 cm. The maximum voltage is 10 V (peak), and the minimum voltage is 5 V (peak). The frequency is 100 MHz.



a. Determine the standing wave ratio (SWR), the magnitude of the reflection coefficient KL, and the wavelength on the cable.

b. Determine KL and the value of the load impedance ZL.

c. Provide two possible realizations of ZL (one in series and one in parallel).

d. Calculate the amplitude of the incident voltage wave and the amplitude of the voltage across the load.