

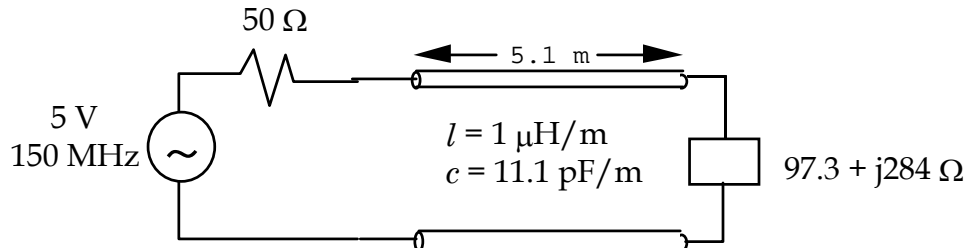
Transmission line matching & Smith charts

Reading assignment

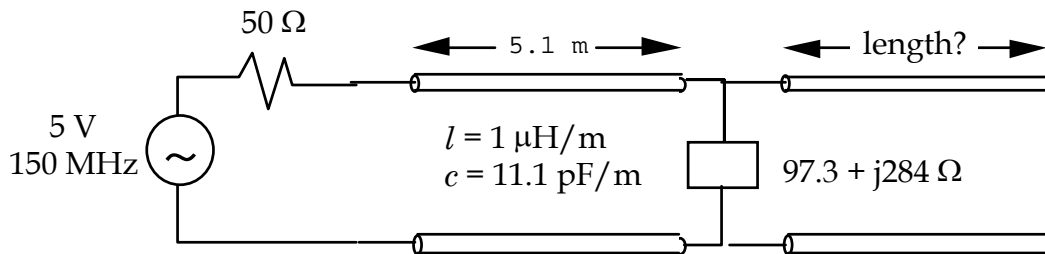
Ulaby, 2-9, 2-10

Problem 1 - Matching a complex load

The following transmission line problem has a complex load as is often encountered in antenna applications. Assume the transmission line is lossless.



- Find the reflection coefficient.
- Determine the standing wave ratio on the transmission line.



- A second transmission line can be added in parallel to the load to give a total impedance that is real. What Z_{line} in parallel with the load gives a total impedance that is real? (Hint: Use admittances $Y = 1/Z$).
- Determine the length of open-circuited transmission line that gives the desired Z_{line} .
- Calculate the new reflection coefficient and standing wave ratio for the modified load. Compare with the answers to part a. and b.

Problem 2 (Optional) - Smith chart*Unmodified load*

- Find the normalized impedance of the unmodified load of Problem 1a and locate it on the Smith chart.
- Determine the reflection coefficient of the unmodified load.

Modified load

- In Problem 1c and 1d, you determined that an open circuited transmission line with $Z_{\text{line}} = -317.3j$ could be used to reduce reflections. Locate the position on the Smith chart of the open circuit load and Z_{line} . Use the Smith chart to find the length of transmission line needed to create Z_{line} .
- Locate the modified load on the Smith chart. Then use the Smith chart to determine $Z_{\text{in}}(z=0)$.