

University of Portland School of Engineering

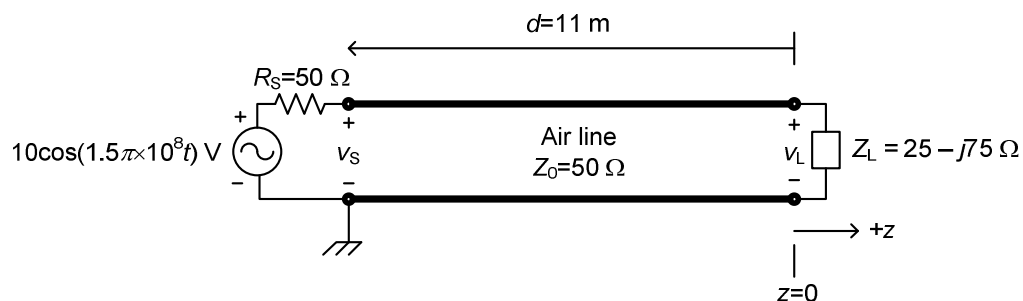
EE 301
Spring 2014
A.Inan

Homework # 5–Sinusoidal Steady-State (AC) Waves on Transmission Lines

(Assigned: Monday, March 17, 2014)

(Due: Wednesday, March 26, 2014, 11:25a.m.)

- (1) A 50Ω , 11 m long air transmission line terminated with a load impedance of $Z_L=25-j75 \Omega$ is excited by a sinusoidal voltage source, as shown.



Calculate the following:

- (a) The load reflection coefficient Γ_L .
- (b) The standing wave ratio S on the line.
- (c) Find all the V_{\max} and V_{\min} positions (in actual lengths) on the line and present your results in a table form.
- (d) Find the input impedance Z_{in} seen at each V_{\max} and V_{\min} position.
- (e) Find the input impedance Z_{in} seen at the source end of the line and draw the equivalent lumped circuit with respect to the source end.
- (f) Find the phasor voltages V_S , V^+ , V^- , and V_L .
- (g) Find the V_{\max} and V_{\min} values.
- (h) Find the time-average powers P^+ , P^- , P_{RS} , P_L , and P_{source} . What percentage of the power carried by the incident wave reflects back to the source?
- (i) (Optional) Find the positions on the line where $Z_{in}=Z_0+jX_{in}$. Find X_{in} values at these positions.
- (j) (Optional) Find the I_{\max} and I_{\min} positions on the line.
- (k) (Optional) Find the I_{\max} and I_{\min} values.
- (l) Repeat all the above calculations for a load impedance of $Z_L=25+j25 \Omega$.
- (m) How many Waldo are hiding on this handout?

An Important Reminder Note:

EE 301-Midterm # 2 is scheduled to be given on Friday, April 4, 2014! ☹
(It will be in-class closed-book exam. Two formula sheets will be allowed.)