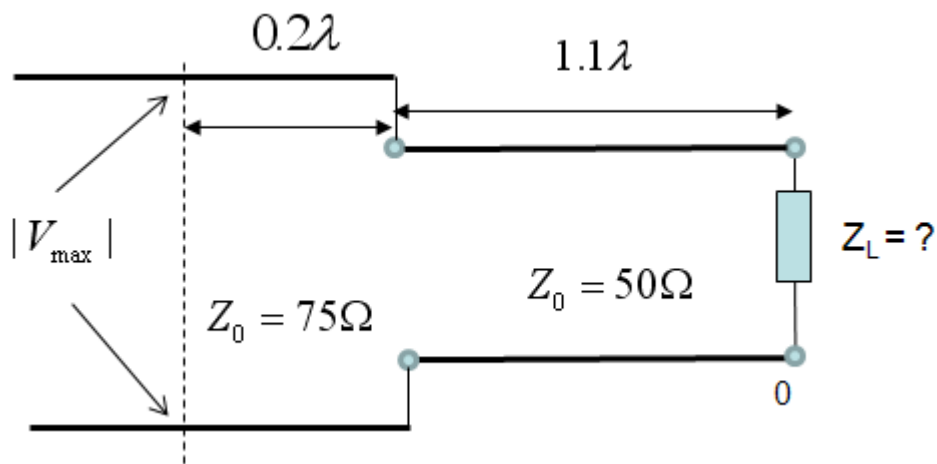


EE Problem 8

Solve the following problem using Smith chart

A 50-Ω lossless transmission line of length  $1.1\lambda$  is terminated with an unknown load impedance. The input end of the 50-Ω line is attached to the load end of a 75-Ω lossless transmission line. A voltage standing wave ratio (VSWR) of 4.0 is measured on the 75-Ω line. The first voltage maximum occurs at a distance of  $0.2\lambda$  in front of the junction between the two lines. Use Smith chart to find out the unknown load impedance on the 50-Ω lossless transmission line.



Solution:

- (1) the load impedance on the 75-Ω line is located at point A on Smith chart. The normalized load impedance is  $z_L = 0.25 + j0.31$ . The load impedance is therefore  $Z_L = 18.7 + j23.2\ \Omega$
- (2) the normalized input impedance on the 50-Ω line is:  $z_{in} = 0.375 + j0.465$ , which is point B on Smith chart.
- (3) the normalized load impedance  $z_L = 0.39 - j0.18$ , point C on Smith chart
- (4) The load impedance on the 50-Ω line is therefore  $Z_L = 20 - j9\ \Omega$ .

