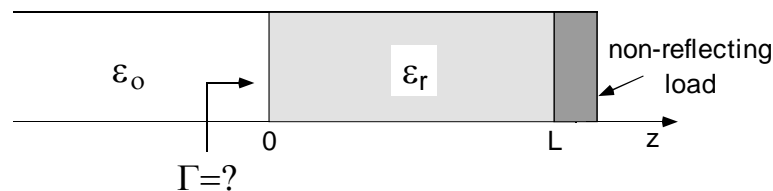


Reading Assignment: Cheng Chapter 10 & Handouts**Homework #5****Due: Friday 24 February 2006**

- 1) Do Problem P.10-4 in Cheng.
- 2) Do Problem P.10-10 in Cheng.
- 3) A section of air-filled rectangular waveguide is loaded with a dielectric material ($\epsilon_r = 2$) and terminated with a non-reflecting load as shown below. The waveguide dimensions are $a=0.9$ " and $b=0.4$ ", and the dielectric-filled section is 5 cm in length. Find the reflection coefficient Γ at the air-dielectric interface for an 8 GHz wave incident from the air-filled section (ignore the possibility that the discontinuity may excite high-order evanescent modes). Does your answer change if the frequency is raised to 8.5 GHz? (Hint: pay close attention to factors that may be influenced by the dielectric constant in the loaded section).



- 4) An air-filled rectangular waveguide is 150 meters long, and is short-circuited at one end with a metal plate. If a short Gaussian pulse with a carrier frequency of 7.2 GHz is introduced at the input end of the guide, approximately how long will it take for the pulse to return to the input end? Assume a cutoff frequency of 6.5 GHz.
- 5) Do Problem P.10-31 in Cheng.
- 6) Using the program of your choice, plot the fraction of incident power absorbed by a load resistor R_L terminating a 50Ω transmission line for load resistances in the range $10\Omega < R_L < 200\Omega$. For what range of load resistance is at least 90% of the incident power absorbed?.
- 7) Simulate the simple quarter-wave matching network example on the web site using ADS