

EENG 433 MICROWAVE APPLICATIONS

HOMEWORK 1

Due: 14/03/2016

Due: 16/03/2016

A microstrip line constructed on FR-4 with $W=3.058\text{mm}$, $\epsilon_r = 4.4$, $t = 0.1\text{mm}$, $h=1.7\text{mm}$ is terminated by a load of impedance of 400Ω . The power at the input terminal is 200W at $f=2.45\text{GHz}$. By using the Pozar's approximation:

- a) Find the characteristic impedance Z_o of the $W=3.058\text{mm}$ line.
- b) Calculate the load reflection coefficient.
- c) How much of the power is delivered to the load?
- d) Calculate the characteristic impedance Z_o^1 of the quarter wavelength long line that could be used to match the load and increase the power delivered to the load.
- e) Find the width of this section.
- f) Place a section $\ell = \frac{\lambda}{4}$ of impedance Z_o^1 between the load and the line with Z_o . Calculate the input impedance by using the general expression of Z_{in} and the new reflection coefficient at the discontinuity of Z_o and Z_o^1 .
- g) How much of the power is now delivered to the load?
- h) What is the power delivered to the load when the frequency is changed to $f=3\text{GHz}$?