

Fields and Waves

Lesson 4.6

TRANSMISSION LINES - LOAD MATCHING



Load Matching

Traditional application of Transmission Lines

- connect radio transmitter and antenna

Antenna Impedance:

- **Real Part** - Radiation; Radiative Power looks like Resistive Loss to rest of circuit
- **Imaginary Part** - Reactive Power - not Radiated
- Function of Frequency
- Good antennas have real impedance - 1/2 wave dipole has $Z_L \sim 73\Omega$, but non-ideal properties affect this, e.g. nearby metal, people, ground
- Need to adjust for individual setup

Load Matching

Objective in Load Matching:

1. Keep Reactive Power Small

- Why?
- waste of power
 - can damage equipment during short circuit (for example)

2. Maximize Power to the Load



- can be achieved by minimizing Γ , by minimizing $Z_L - Z_o$
- can also improve coupling if $\Gamma_s = 0$
 - that's why Function Generator has 50Ω output impedance
 - also to reduce bounces

Load Matching - Problem 1

Problem 1 is the simplest example

If Z_L is complex, eliminating the imaginary part will decrease Γ

Do Problem 1a and 1b

For matching, will need reactive components

At high frequencies, use transmission lines to make L & C
- standard components often will not work