

### Experiment- 3: Simulation of Linear Wire Antenna using EZNEC

- 1. Aim:** A) To plot the radiation pattern of a horizontal dipole placed at height 'h' from a ground plane using EZNEC software.  
B) To observe the effects of change in height/frequency on the radiation pattern  
C) To verify the current Distribution over the dipole length

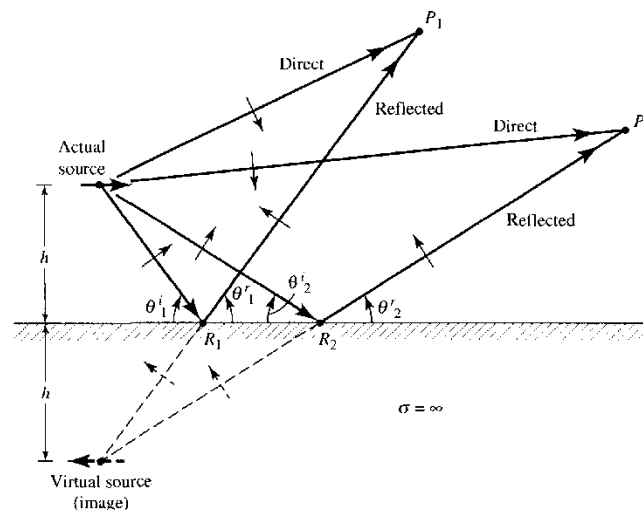
**2. Requirements:**

- Desktop PC
- EZNEC Antenna Software (Demo program)

**3. Pre-experiment Exercise**

**Brief Theory**

The presence of an obstacle, especially when it is near the radiating element, can significantly alter the overall radiation properties of the antenna system. In practice the most common obstacle that is always present, even in the absence of anything else, is the ground. A horizontal dipole placed above an infinite ground plane is shown in the Figure below:



Any energy from the radiating element directed toward the ground undergoes a reflection. The amount of reflected energy and its direction are controlled by the geometry and constitutive parameters of the ground. In general, the ground is a lossy medium whose effective conductivity increases with frequency. Therefore it should be expected to act as a very good conductor above a certain frequency, depending primarily upon its composition and moisture content.

**4. Laboratory Exercise**

**A. Procedure:**

1. Using the desktop shortcut, open the EZNEC program. The control center pops up. Within the help file contents, open the “Test Drive” section and click on “Along the Straightaway”. A description appears.
2. Create a horizontal dipole as explained in the description.
3. Change the units and wire diameter to wavelengths.
4. Observe the current distribution
5. Change the height from the ground plane and observe the effect on radiation pattern.
6. Add the old trace to the new plot to aid comparison.
7. Now change the ground description and see its effect on the radiation pattern.
8. Repeat step 5.

**5. Post Experiment Exercise:**

**A. Results:**

1. Take a print of the antenna configuration with the current distribution over it.
2. Print the radiation pattern for different heights and frequency above the ground surface.

**B. Conclusion/Comments**

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**C. Questions:**

1. Explain ground effects in horizontal electric dipole.
2. Explain vector potential.
3. Derive the field expressions for infinitesimal dipole antenna.