



LAB 11 - Broadside And Endfire Antennas

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Purpose:

The radiation patterns of two antennas will be compared. The element lengths and spacing will be the same for both however the phasing of the driven elements will be different. The use of NEC4WIN will be required for this analysis. An evaluation copy is available on line.

Prelab:

Determine the geometry, for entry into NEC4WIN, of an ENDFIRE array that has 3 elements all 1 meter in length with 0.5 wavelength spacing. Assume X1 and X2 for the first wire to be set to 0. The antenna is horizontally polarized. A sketch may aid your efforts. The elements resonate as half wavelength elements. Calculate the frequency of operation ahead of time for entry into the program.

Procedure:

1. Enter the results of your prelab in ANTENNA SETUP under GEOMETRY. Make sure you specify HEIGHT (ex. 10 meters) and FREQUENCY. Click OK.
2. Return to ANTENNA SETUP and select IN FREE SPACE. You will choose GROUND PLANE later.
3. Enter into ANTENNA SETUP again and click SOURCES. Follow step 4.
4. Make certain to enter 3 sources and then label the point where each source should be pulsed. Set the phasing so the antenna operates as endfire. This means that the box labeled PHASE will be at 0 for all three sources ensuring all elements are in phase.
5. Next you will go to PLOT and select FAR FIELD . Set the box labeled ANGLE to to 38 degrees. Observe the field pattern of Azimuth in free space. Provide a printout of the azimuth plot. You should also observe the Zenith plot as well. A printout of the Zenith pattern is not necessary. You can repeat this same exercise by changing in FREE SPACE to GROUND PLANE. **Note:** the beamwidth and gain of major lobes should be recorded for from the free space plots.
6. Change the antenna phasing in order for it to operate as a broadside array and observe IN FREE SPACE. You will need to return to SOURCES to change PHASE.
7. Observe the FAR FIELD plot of azimuth in free space. Provide a printout of the azimuth. Note and record the beamwidth and gain of major lobes in free space. You may observe the Zenith plot as well. A printout is not necessary. Repeat this exercise in GROUND PLANE.
8. Compare your results with the endfire antenna. Discuss the directions of maximum radiation for both antennas in your lab report as well as summarize the criteria required to develop this change.