

Experiment- 7: Simulation on Uniform Antenna Arrays

1. **Aim :** To write a code in Scilab to implement broadside and endfire arrays and study the radiation characteristics.
2. **Requirements**
 - Scilab software
3. **Pre-experiment Exercise**

Brief Theory

Usually the radiation pattern of a single element is relatively wide, and each element provides low directivity (gain). Very high gain or directivity can be accomplished by increasing the electrical size of the antenna. Another way to enlarge the dimensions of the antenna, without necessarily increasing the size of the individual elements, is to form an assembly of radiating elements in an electrical and geometrical configuration. This new antenna formed by multielements is referred to as an array.

In many applications it is desirable to have the maximum radiation of an array directed normal to the axis of the array (broadside). In a uniform linear array, for the maximum of the array factor to be broadside to the axis of the array, it is necessary that all the elements have the same phase excitation (in addition to the same amplitude excitation).

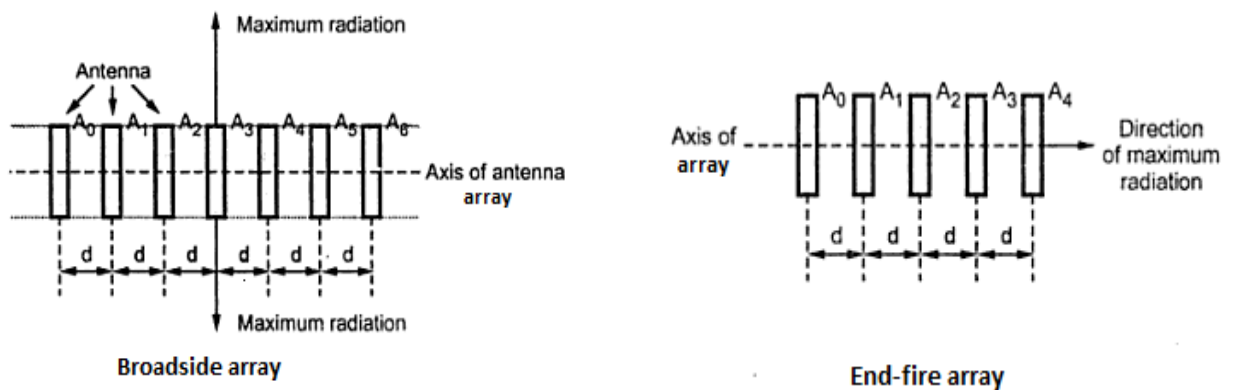


Figure 1: Broadside and endfire arrays.

On the other hand, maximum radiation in an end-fire array occurs along the axis of the array. An end-fire array looks similar to a broadside array. The currents in the elements of the end-fire array, however, are usually 180 degrees out of phase with each other as indicated by the arrows.

4. Laboratory Exercise

Procedure:

1. Develop the code for broadside and endfire arrays.
2. Observe the polar plot of the magnitude of normalized array factor.
3. Observe the effect of constants on the response and justify it.

5. Post Experiment Exercise:

Attach

1. Copy of code written on Scilab
2. Output obtained for Broadside array.
3. Output obtained for Endfire array.

A. Conclusion/Comments

B. Questions

1. Compare broadside and endfire antenna array.
2. Explain pattern multiplication principle.
3. What do you mean by grating lobes? Write the conditions to avoid grating lobes.