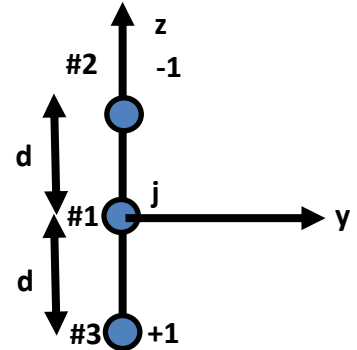


Linear Antenna Arrays

Three-Element Isotropic Array

A three-element array of isotropic sources has the phase and magnitude relationships shown. The spacing between the elements is $\lambda/2$.

- Find the array factor. You can use the summation method or the closed form sinusoidal function.
- Find all the nulls.



Linear Array Design

Design an ordinary end-fire uniform linear array with only one maximum so that its directivity is 20 dB above isotropic. The spacing between elements is $\lambda/4$, and its length is much greater than the spacing. Determine the

- Number of elements
- Overall length of the array (in wavelengths)
- Progressive phase shift between the elements (in degrees)

Linear Array Design

It is desired to design a linear uniform end-fire array that will maximize its directivity along the $\theta = 0^\circ$ direction only. The array elements are all placed along the z-axis with a uniform spacing d between them. The desired maximum directivity is 9.5545. Determine the

- Array design: state its name.
- Number of elements
- Exact spacing in between the elements (in wavelengths)
- Exact progressive phase difference between the elements (in degrees)
- Plot of the normalized array factor in polar form