Antenna Array Notes

For a dipole array antenna with the arrays lined up on the x-axis, the following field pattern characteristics are valid.

1. *Main-beam direction*
   The maximum value of the array pattern factor, $|F(\theta, \phi)|$, occurs when $kd\sin\theta \sin\phi + \psi = 0$, which leads to

$$\sin\theta \sin\phi = -\frac{\psi}{kd} \quad .$$

   Two special cases are of particular importance.

   (a) *Broadside Array*
   For a broadside array, maximum radiation occurs at a direction perpendicular to the line of the array: that is, $\phi = \pm \pi/2$. This requires that the antennas are excited in phase, or $\psi = 0$.

   (b) *Endfire Array*
   For an endfire array, maximum radiation occurs at $\phi = 0$. The antennas are excited out of phase