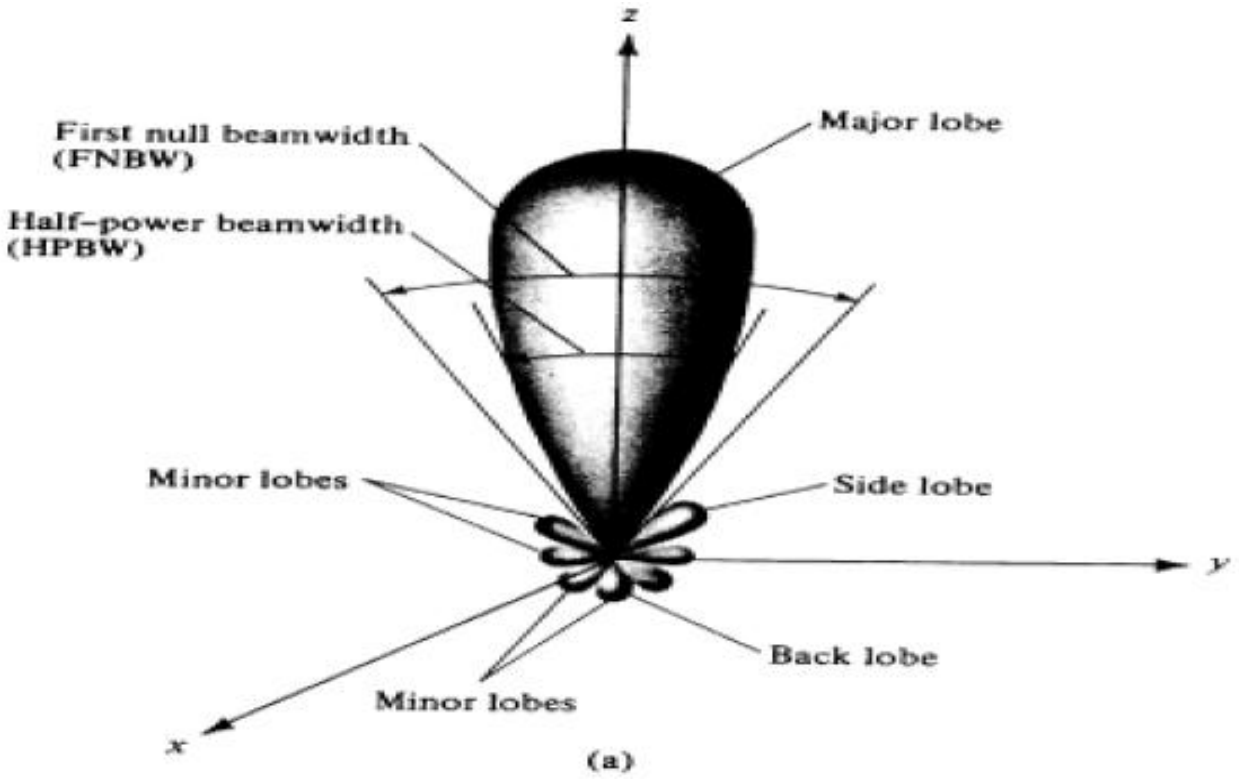
PATTERN LOBES AND BEAMWIDTHS

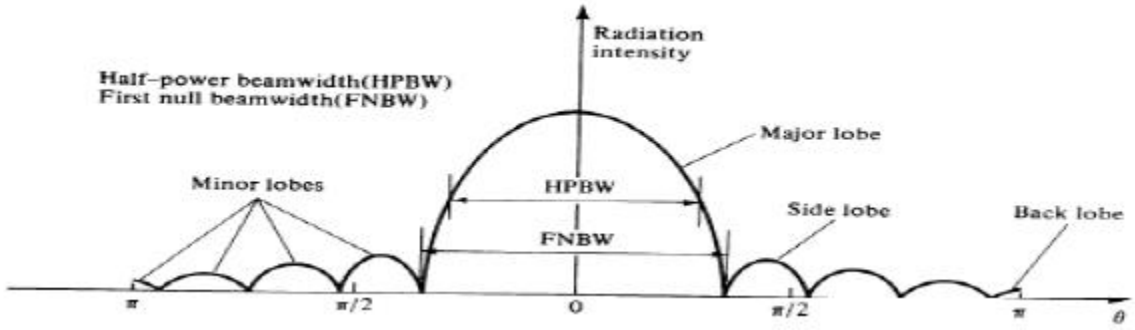
The radiation pattern characteristics involve three dimensional vector fields for full representation, but the scalar quantities can be used. They are:

1. Half power beam-width HPBW
2. Beam Area, Ω_A
3. Bema Efficiency, ε_M
4. Directivity D, Gain G
5. Effective Aperture, A_e
6. Radiation Intensity



Pattern in spherical co-ordinate system

Beamwidth is associated with the lobes in the antenna pattern. It is defined as the angular separation between two identical points on the opposite sides of the main lobe. The most common type of beamwidth is the half-power (3 dB) beamwidth (HPBW). To find HPBW, in the equation, defining the radiation pattern, we set power equal to 0.5 and solve it for angles. Another frequently used measure of beamwidth is the first-null beamwidth (FNBW), which is the angular separation between the first nulls on either sides of the main lobe.



Pattern in Cartesian co-ordinate system

Beamwidth:

Antenna Beam-width is the measure of directivity of an antenna. The antenna beamwidth is the angular width expressed in degrees which is measured on the major lobe of the radiation pattern of an antenna.

HPBW:

The angular width on the major lobe of radiation pattern between two points where the power is half of the maximum radiated power is called Half Power Beam-width. Here the power decreases to half of its maximum value.

FNBW:

When the angular width is measured between the first nulls or first side lobes it is called First Null Beam Width.

The factors affecting beam width are:

1. Shape of the radiation pattern.
2. Dimensions of antenna.
3. Wavelength.

Beam width defines the resolution capability of the antenna, i.e., the ability of the system to separate two adjacent targets.