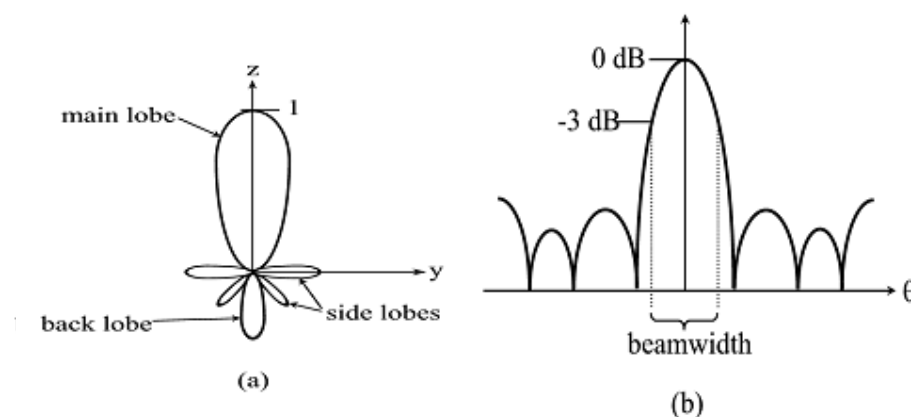


## RADIATION PATTERN OF ANTENNA

### Radiation Pattern:

The radiation pattern of antenna is a representation (pictorial or mathematical) of the distribution of the power out-flowing (radiated) from the antenna (in the case of transmitting antenna), or inflowing (received) to the antenna (in the case of receiving antenna) as a function of direction angles from the antenna.

Antenna radiation pattern (antenna pattern): It is defined for large distances from the antenna, where the spatial (angular) distribution of the radiated power does not depend on the distance from the radiation source is independent on the power flow direction

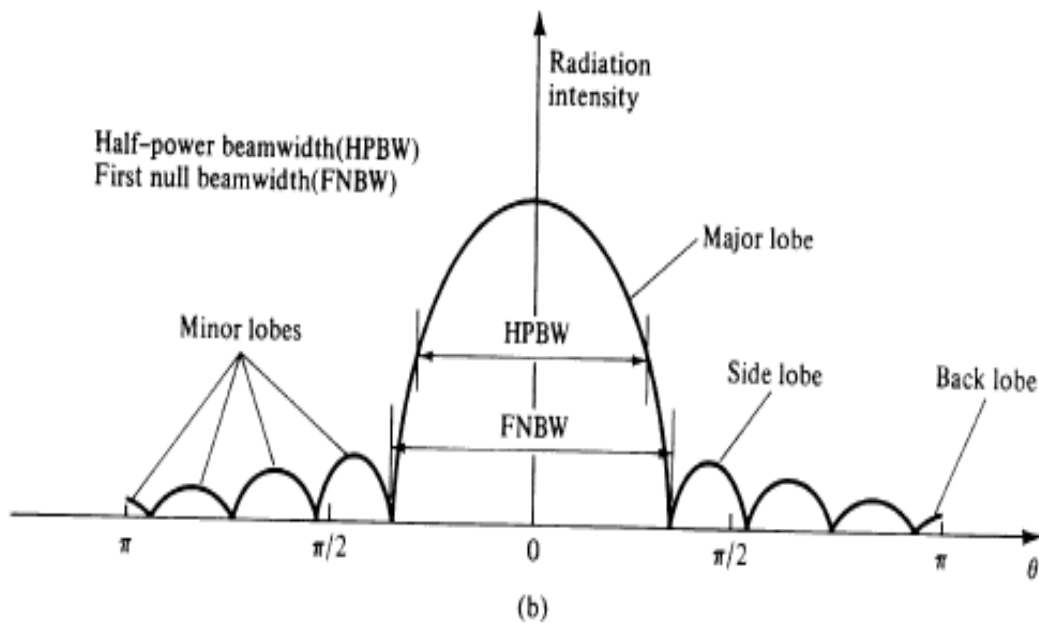
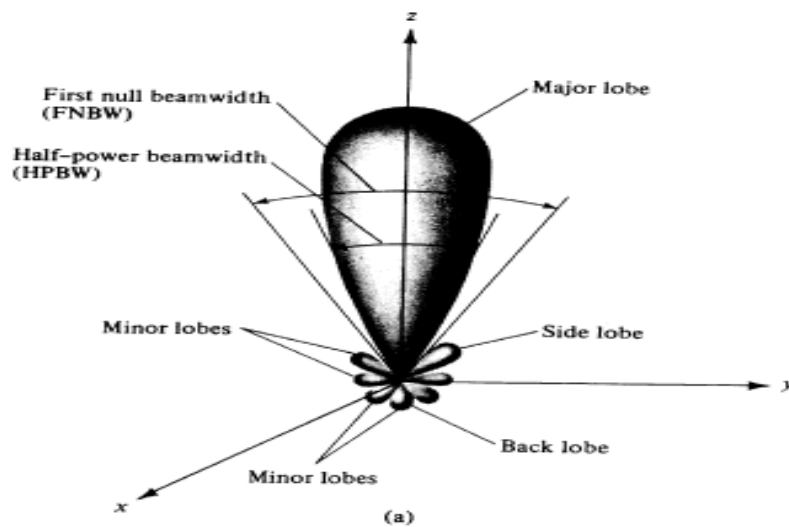


It is clear in Figures a and b that in some very specific directions there are zeros, or nulls, in the pattern indicating no radiation.

The protuberances between the nulls are referred to as lobes, and the main, or major, lobe is in the direction of maximum radiation.

There are also side lobes and back lobes. These other lobes divert power away from the main beam and are desired as small as possible.

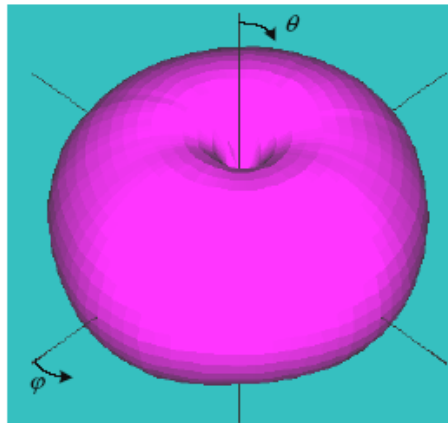
**Pattern lobe** is a portion of the radiation pattern with a local maximum. Lobes are classified as: major, minor, side lobes, back lobes



**Normalized pattern:**

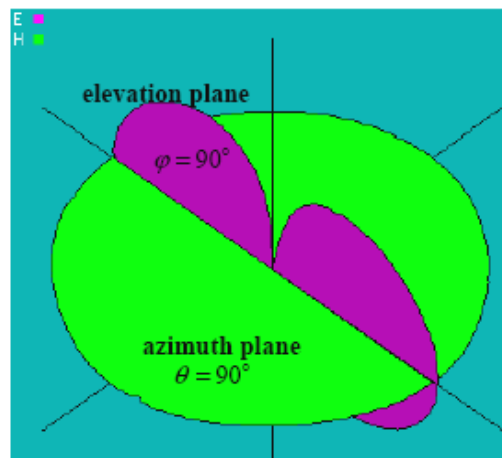
Usually, the pattern describes the normalized field (power) values with respect to the maximum value.

Note: The power pattern and the amplitude field pattern are the same when computed and when plotted in dB.



3-Dimensional pattern

Antenna radiation pattern is 3-dimensional. The 3-D plot of antenna pattern assumes both angles  $\theta$  and  $\phi$  varying.



2-Dimensional pattern

Usually the antenna pattern is presented as a 2-D plot, with only one of the direction angles,  $\theta$  or  $\phi$  varies.

It is an intersection of the 3-D one with a given plane .Usually it is a  $\theta = \text{const}$  plane or a  $\phi = \text{const}$  plane that contains the pattern's maximum.