3D RADIATION PATTERN

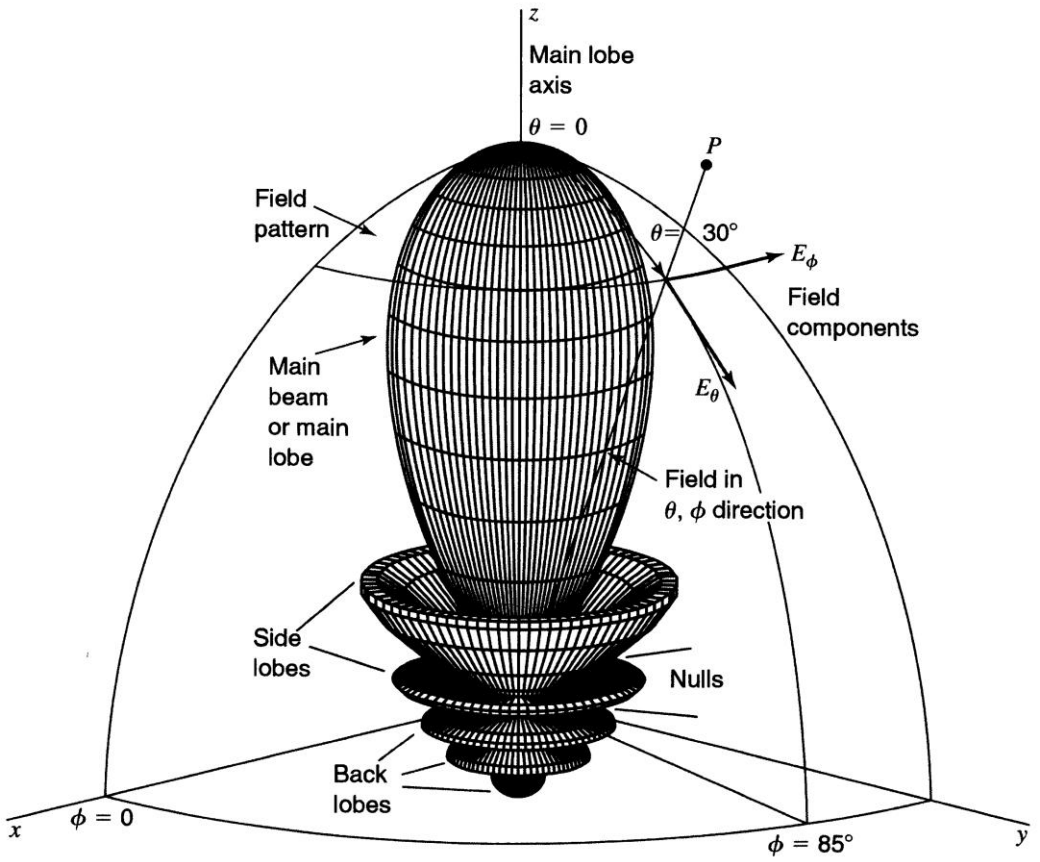
The radiation pattern describes the variation of field magnitude or of power density (proportional to field squared) **as a function of the spherical coordinates** $(\boldsymbol{\theta}, \boldsymbol{\varphi})$**.**

Radiation patterns refer always to the far-field, as only in the far-field region the field angular distribution is independent of the distance from the origin.

The 3D pattern surface is obtained by setting the distance from the origin in the direction (θ, φ) to be proportional to the field magnitude or power density.

Usually, the patterns are normalized with respect to the maximum value.

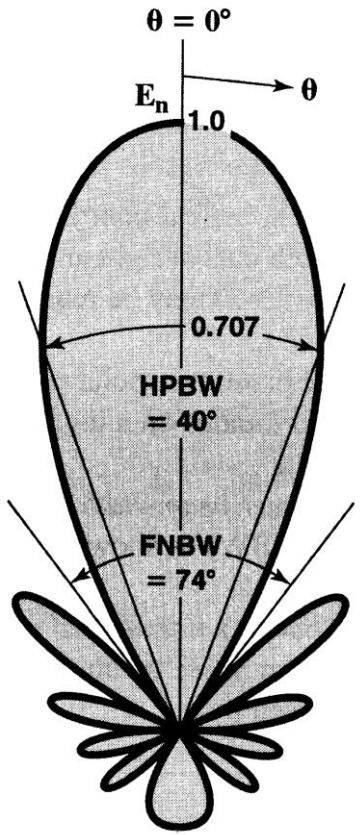
Most of the radiation is contained in a main lobe (or beam) accompanied by radiation also in minor lobes (side and back lobes). Between the lobes there are nulls where the field goes to zero. A radiation pattern could have more than one main lobe (those lobes have maximum normalized magnitude equal to 1).

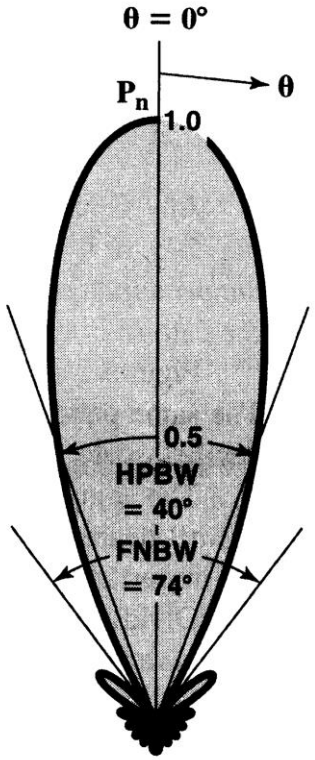


2D RADIATION PATTERN

A bidimensional pattern is obtained by considering the intersection of the 3D radiation pattern with a given plane; this plane is described by θ =constant or φ =constant and contains the pattern maximum.

polar plot of field pattern (linear scale)

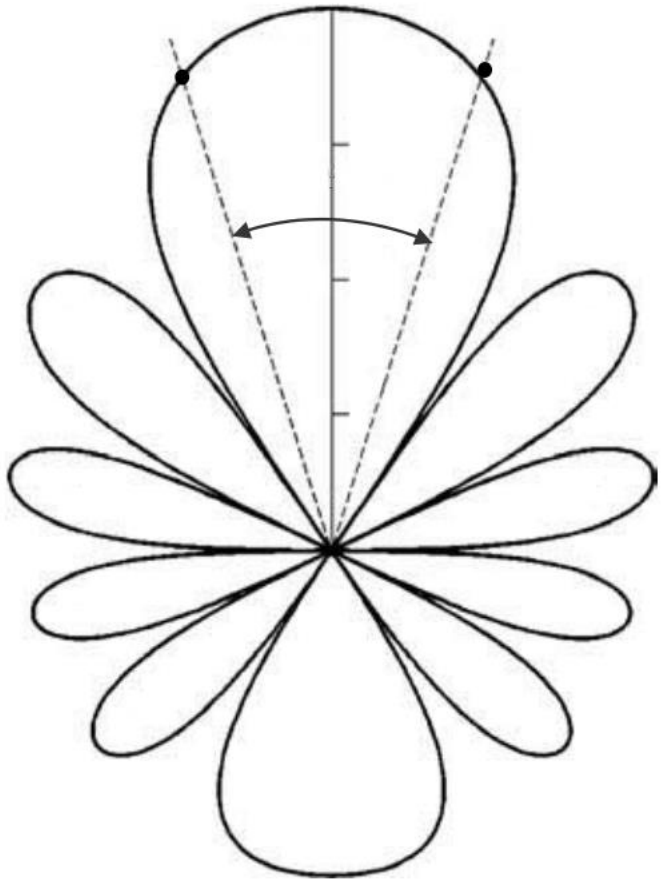




polar plot of power pattern (linear scale)

Power patterns are usually plotted on a logarithmic (decibel, dB) scale: this scale is desirable because a logarithmic scale can accentuate in more details those parts of the pattern that have very low values (as the secondary lobes).

polar plot of power pattern (dB scale)



Cartesian plot of power pattern (dB scale)