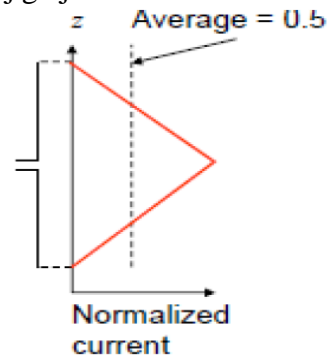# GHHGEVKXG'J GKI J V

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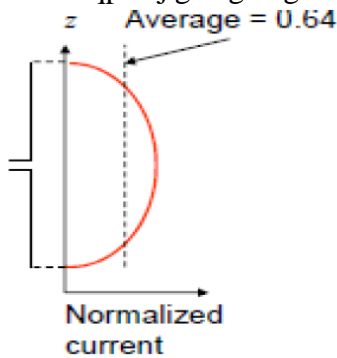
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$R?X^4 l*6T_t+.$'xqnci g"ku"i kxgp"d{"X?j g"G0'

Vj gtghqtg'R?*j g"G+^4 l*6T_t+"

Kp'vgto u'qh'Ghhgevkxg'cr gtwtg"vj g"uco g'r qy gt'ku'i kxgp"d{"

$R?UC_g? "*G^4 l_2+C_g"$

Gs wcvkpi "vj g"y q."

$$P=\frac{h_e^2 E^2}{4R_r}=\frac{E^2}{Z_0} A_e \Rightarrow h_e=\sqrt{\frac{4R_r A_e}{Z_0}} \ (m) \ and \ A_e=\frac{h_e^2 Z_0}{4R_r} \ (m^2)$$

Bandwidth or frequency bandwidth:

This is the range of frequencies, within which the antenna characteristics (input impedance, pattern) conform to certain specifications . Antenna characteristics, which should conform to certain requirements, might be: input impedance, radiation pattern, beamwidth, polarization, side-lobe level, gain, beam direction and width, radiation efficiency. Separate bandwidths may be introduced: impedance bandwidth, pattern bandwidth, etc.

The FBW of broadband antennas is expressed as the ratio of the upper to the lower frequencies, where the antenna performance is acceptable.

Based on Bandwidth antennas can be classified as

1. Broad band antennas-BW expressed as ratio of upper to lower frequencies of acceptable operation eg: 10:1 BW means f_H is 10 times greater than f_L

2. Narrow band antennas-BW is expressed as percentage of frequency difference over centre frequency eg:5% means $(f_H - f_L) / f_o$ is .05. Bandwidth can be considered to be the range of frequencies on either sides of a centre frequency(usually resonant freq. for a dipole)

The FBW of broadband antennas is expressed as the ratio of the upper to the lower frequencies, where the antenna performance is acceptable

$$FBW = f_{max} / f_{min}.$$

Broadband antennas with FBW as large as 40:1 have been designed. Such antennas are referred to as frequency independent antennas.

For narrowband antennas, the FBW is expressed as a percentage of the frequency difference over the center frequency

$$FBW = \frac{f_{max} - f_{min}}{f_0} \cdot 100 \%.$$

Usually, $f_0 = (f_{max} + f_{min}) / 2$ or $f_0 = \sqrt{f_{max} f_{min}}$.

The characteristics such as Zi, G, Polarization etc of antenna does not necessarily vary in the same manner. Some times they are critically affected by frequency Usually there is a distinction made between pattern and input impedance variations. Accordingly pattern bandwidth or impedance bandwidth are used .pattern bandwidth is associated with characteristics such as Gain, Side lobe level, Polarization, Beam area. (large antennas)

Impedance bandwidth is associated with characteristics such as input impedance, radiation efficiency(Short dipole)

Intermediate length antennas BW may be limited either by pattern or impedance variations depending on application

If BW is Very large (like 40:1 or greater), Antenna can be considered frequency independent.