Sheet (4)

1. Draw the current distribution along a symmetrical dipole made of infinity thin wire in the following cases
   L=0.1λ, L=0.5 λ, L= λ, L=1.5 λ, L=2 λ.

2. Compare the amplitudes of currents that would be required in a half wave dipole and small dipole of length 0.05 λ to produce 100W of radiated power from each.

3. A center fed electric dipole of length L is attached to a balanced lossless transmission line with Z_o=50Ω. Assuming the dipole is resonant at L= **λ/50, L=λ/2,** Find VSWR.

4. Calculate the 3dB beam width of a wire symmetrical antenna with length 15m, knowing that the central frequency is 10MHz.

5. For an antenna with a maximum linear dimension of D, find the boundary of far field region so that the maximum phase error does not exceed (a) π/16 rad (b) π/4 rad (c) 18^o (d) 15^o

6. A 3-cm long dipole carries a phasor current $I_0 = 10\ e^{j60}$A. Assuming that λ =5 cm, determine the E- and H-fields at 10 cm away from the dipole and at θ = 45^o.

7. For an antenna with an overall length $l = 5\lambda$, the observations are made at $r = 60\lambda$. Find the errors in phase and amplitude when we use far field approximation for the distance from the source to the observation point.

8. The boundary of the far-field was selected based on a maximum phase error of 22.5◦, which occurs at directions of 90 from the axis along the largest dimension of the antenna.
   For an antenna of maximum length of 5λ, what do this maximum phase error reduces to at an angle of 30◦ from the axis along the length of the antenna?
   Assume that the phase error is totally contributed by the respective first higher order term that is being neglected in the infinite series expansion of the distance from the source to the observation point.

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9. A 15 M Hz uniform plane wave having a peak electric field intensity $E_0 = 0.05$ V/m is incident on a 2.5 λ long dip ole at an angle θ. Assume lossless dipole

a) Plot the current on the dipole .
b) Find the angles of incidence θ that will give a zero open circuit voltage Voc at the terminals of the dipole.
c) Plot the far-field E plane pattern of the dipole (Polar plot).

REPORT

1. Draw Elevation plane of radiation pattern for a thin dipole with sinusoidal current distribution *(l = λ/50, λ/4, λ/2, 3λ/4, λ)*. Determine HPBW for each.

Good Luck

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