EE 483/583 Antennas for Wireless Communications (Spring 2024)

Homework 4

Tuesday, February 6, 2024

1) If the vector electric potential for an antenna is $\overline{F} = \hat{a}_y C_0 \dfrac{e^{-jkr}}{r}$, find $\overline{E} = \overline{E}_{FF}$ and $\overline{H} = \overline{H}_{FF}$ in the **far-field**. Give your answers in spherical coordinates. Assume $\overline{A} = 0$.

2) Given the vector magnetic potential for an antenna is $\overline{A} = \hat{a}_\phi A_0 \cos\theta \left[\dfrac{e^{-jkr}}{r} + \dfrac{j2ke^{-jkr}}{r^2} \right]$, find $\overline{E}$ and $\overline{H}$ **everywhere**. Give your answers in spherical coordinates. Assume $\overline{F} = 0$. Factor out common terms, e.g., $A_0 e^{-jkr} \big/ r$.

3) Given the vector magnetic potential for an antenna is $\overline{A} = \hat{a}_\phi A_0 \cos\theta \left[\dfrac{e^{-jkr}}{r} + \dfrac{j2ke^{-jkr}}{r^2} \right]$, find $\overline{E} = \overline{E}_{FF}$ and $\overline{H} = \overline{H}_{FF}$ in the **far-field**. Give your answers in spherical coordinates. Assume $\overline{F} = 0$.

4) **EE 483 only-** If the vector electric potential for an antenna is $\overline{F} = \hat{a}_y C_0 \dfrac{e^{-jkr}}{r}$, find $\overline{E}$ and $\overline{H}$ everywhere. Give your answers in spherical coordinates. Assume $\overline{A} = 0$. Factor out common terms, e.g., $C_0 \dfrac{e^{-jkr}}{r}$.

5) **EE 583 only-** 3.1

Due Tuesday, February 13, 2024