## EE 483/583 Antennas for Wireless Communications (Spring 2017) Homework 4 Monday, February 6, 2017

- 1) If the vector <u>electric</u> potential for an antenna is  $\overline{F} = \hat{a}_y C_0 \frac{e^{-jkr}}{r}$ , 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 that the vector <u>magnetic</u> potential for an antenna is  $\overline{A} = \hat{a}_{\theta} A_0 \sin \theta \left[ \frac{e^{-jkr}}{r} + \frac{jke^{-jkr}}{r^2} \right]$ , find  $\overline{E}$  and  $\overline{H}$  everywhere. Give your answers in spherical coordinates. Assume  $\overline{F} = 0$ . Factor out common terms, e.g.,  $A_0 \frac{e^{-jkr}}{r}$ .
- 3) Given that the vector <u>magnetic</u> potential for an antenna is  $\overline{A} = \hat{a}_{\theta} A_0 \sin \theta \left[ \frac{e^{-jkr}}{r} + \frac{jke^{-jkr}}{r^2} \right]$ , 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 583 only- If the vector <u>electric</u> potential for an antenna is  $\overline{F} = \hat{a}_y C_0 \frac{e^{-jkr}}{r}$ , find  $\overline{E}$  and  $\overline{H}$  everywhere. Give your answers in spherical coordinates. Assume  $\overline{A} = 0$ . Factor out common terms, e.g.,  $C_0 \frac{e^{-jkr}}{r}$ .

## Due Friday, February 10, 2017.