EE 483/583 Antennas for Wireless Communications (Spring 2024)
Homework 6
Thursday, February 22, 2024

1) 4.2 First, find the vector magnetic potential $\bar{A}$ in spherical coordinates.
2) 4.18 (f) $\pi/20$.
3) 4.25 (c) As part of your solution, compute radiation R_r and loss R_L resistances using equations from text and again using NEC-2. [Let $\Delta \sim 16a$. List NEC input file and relevant excerpts of output file.] Tabulate answers and discuss differences. You do not need to use program Dipole.
4) 4.32
5) A thin lossless vertical 0.25λ monopole at the origin in free space is fed through an infinite ground (perfect electrical conductor) plane at $z = 0$ with a feed current $I_0 = 1\angle 0°$ A. Determine the: (a) vector far-field phasor electric field, (b) vector far-field phasor magnetic field, (c) vector radiated time-average power density (Poynting vector), (d) radiation intensity, (e) power radiated, (f) maximum directivity (unitless & dBi), and (g) radiation resistance. [Hint: What would be the length ℓ of the image equivalent dipole?]
6) **EE 483 only**: 4.36 Note 'resonate' means no reactance, i.e., $X_{in} = 0$.
7) **EE 583 only**: 4.46 Let $\ell/a = 64$. Do NOT ignore the reactance in this case. [Hint: See 4-70a & 8-60b.] For part (a) Also, find radiation reactance. Check/compare with results using NEC-2 assuming $f = 299.8$ MHz and with $\Delta/a \sim 4$. Note: You may use MathCad, Matlab, … instead of computer program at end of chapter for analytic results.

Due Thursday, February 29, 2024