

Physics 323, Spring Quarter 2015
Electrodynamics: Homework Assignment 4
Turn in all problems and clearly note all constants and assumptions you use.
(1-point penalty each otherwise)
Due 9:00 am Thursday April 30
(A relatively simple problem set)

1. Recall the point charge moving at a constant velocity. One interesting result is that the Liénard-Wiechert potentials can be written in terms of the “present” coordinates of the charge rather than its “retarded” coordinates. Demonstrate this is so.
2. An electron moves in uniform circular motion in the X-Y plane at angular frequency ω . The circular motion is centered on the origin. At $t=0$ the electron is at $x=x_0, y=z=0$. Find the Liénard-Wiechert potentials for points on the z-axis. (This is a classic problem.)
3. Consider the small electric dipole of Griffiths 11.1.2.
 - a. In which direction is the electric field always zero? Which direction is the electric field maximum?
 - b. For the mid-plane ($z=0$), how are the electric field and magnetic fields polarized?
4. A cheap cordless phone operates at a frequency around 1 MHz and its antenna is around 0.1 m long. Estimate the radiation resistance of the antenna. Is more power used in heating the antenna or being radiated away? Explain.