PHYS 622 – HOMEWORK # 11 – DUE FRIDAY, 4/30/2010

Problem 1. Two halves of a perfectly conducting spherical shell of radius R are separated by a very small insulating gap (figure 2.8 of Jackson). An alternating potential $\pm V \cos \omega t$ is applied to the two halves of the sphere, respectively. Compute the radiation fields, the angular distribution of power, and the total radiated power in the long-wavelength limit.

Problem 2. A thin linear antenna of length d is excited in such a way that the sinusoidal current makes a full wavelength of oscillation as shown in problem figure 9.16 on Jackson (p. 453). Calculate *exactly* [Eq. (9.8)] the power radiated per unit angle and the total power.

Problem 3. For the antenna of problem 2, calculate the electric dipole moment, the magnetic dipole moment, and the electric quadrupole moment. Determine the power per unit angle and the total power radiated for the lowest nonvanishing multipole. Compare these results to the exact results of problem 2.