

Problem Set 15

(Due: February 19, 2009)

1) Jackson, problem 9.2.

A radiating quadrupole consists of a square of side a with charges $\pm q$ at alternate corners. The square rotates with angular velocity ω about an axis normal to the plane of the square and through its center. Calculate the quadrupole moments, the radiation fields, the angular distribution of radiation, and the total radiated power, all in the long-wavelength approximation. What is the frequency of the radiation?

2) Jackson, problem 9.11.

Three charges are located along the z axis, a charge $+2q$ at the origin, and charges $-q$ at $z = \pm a \cos \omega t$. Determine the lowest nonvanishing multipole moments, the angular distribution of radiation, and the total power radiated. Assume that $ka \ll 1$.