

For: Thursday, January 26, 2006

Remember, you can volunteer to explain any of these at the board, for 50 points of credit maximum per problem. You don't need to work them all out, these are the problems most closely related to the recent lectures.

Problems in Jackson's 3rd ed.:

9.10a,b hydrogen $2p \rightarrow 1s$ radiative transition

9.10c,d radiation from charge in a Bohr orbital motion

9.11 multipoles of oscillating point charges

9.12 surface waves on a sphere \rightarrow multipole radiation

9.17 multipoles of an antenna with a sine wave current distribution

Other Problem:

W3. A $3d \rightarrow 2p$ transition in hydrogen involves the time-dependent oscillation of charge,

$$\rho = Nr^3 e^{-5r/6a_0} Y_{1,1}(\theta, \phi) Y_{2,0}(\theta, \phi) e^{-i\omega_0 t}.$$

N is a normalization constant and ω_0 is the transition frequency.

- Find all the nonzero electric multipole moments.
- Find the total power radiated by each multipole.
- Find a reasonable approximation (long wavelength limit) for the angular distribution of radiated power.