

Set 2 – due 2 February

“Simple experiments are always best.”–E. Fermi

Three “typical” Jackson quadrupole problems this week. To get going on the first one, I calculated the time dependent quadrupole moment in the time domain before trying to pick off the coefficients of complex exponentials. In all the problems, be alert to the possibility of recycling calculations Jackson already has done for you.

1) [20 points] Jackson 9.2

2) [20 points] Jackson 9.16. Consider the “far field” case only. Use $I = I_0 \sin(2\pi z/d) \exp(-i\omega t)$. In part (a), sketch the angular distribution, do not give a detailed plot. I evaluated the integral

$$\int_0^1 dx \frac{\sin^2 \pi x}{1-x^2} \quad (1)$$

numerically.

3) [20 points] Jackson 9.17. You can borrow formulas 9.50-9.52.

If you are working in CGS; R in ohms (in MKS) is R in CGS times $30c$.