Computational light scattering, fall 2020 (PAP315, 5 cr)
Exercise 1

1-2. Derive expressions for the electric and magnetic fields $\mathbf{E}$ and $\mathbf{B}$ in the electric dipole approximation. Vector potential is

$$\mathbf{A}(\mathbf{r}) \quad = \quad \frac{-ikc\mu_0}{4\pi}\, \mathbf{p}\, \frac{e^{ikr}}{r},$$

where $\mathbf{p}$ is the electric dipole moment. (Jackson 9.2; 12 points)

3-4. Based on the results of Problem 1-2, derive the scattered electromagnetic field in the radiation zone (far zone) and all the elements of the Rayleigh scattering matrix. The relation between the scattering matrix and amplitude scattering matrix elements is presented, e.g., in Bohren & Huffman. (12 points)