

4th Assignment
Subject : Physics II (Electrodynamics)
Date: 16th April 2017

Problem 4.32 A point charge q is imbedded at the center of a sphere of linear dielectric material (with susceptibility χ_e and radius R). Find the electric field, the polarization, and the bound charge densities, ρ_b and σ_b . What is the total bound charge on the surface? Where is the compensating negative bound charge located?

Problem 4.33 At the interface between one linear dielectric and another the electric field lines bend (see Fig. 4.34). Show that

$$\tan \theta_2 / \tan \theta_1 = \epsilon_2 / \epsilon_1,$$

Problem 4.20 A sphere of linear dielectric material has embedded in it a uniform free charge density ρ . Find the potential at the center of the sphere (relative to infinity), if its radius and its dielectric constant is ϵ_r .

Problem 4.21 A certain coaxial cable consists of a copper wire, radius a , surrounded by a concentric copper tube of inner radius c (Fig. 4.26). The space between is partially filled (from b out to c) with material of dielectric constant ϵ_r , as shown. Find the capacitance per unit length of this cable.

Problem 1 For the spherical conducting shells filled with two linear dielectric materials, shown in Fig.1, the potential of inner and outer shell is 0 and V_0 , respectively. Determine the potential distribution in the region $c < r < a$.

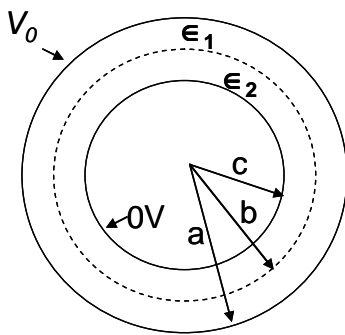


Fig.1

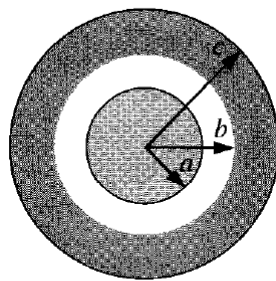


Figure 4.26

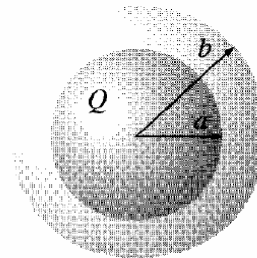


Figure 4.29

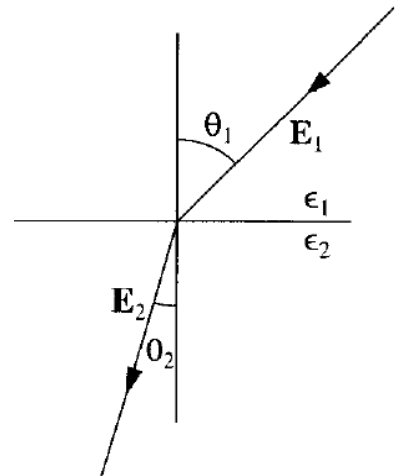


Figure 4.34