# Homework

✓ (Cheng 3-6) Two very small conducting spheres, each of a mass $1.0 \times 10^{-4} (kg)$, are suspended at a common point by very thin nonconducting threads of a length 0.2 (m). A charge Q is placed on a each sphere. The electric force of repulsion separates the spheres, and an equilibrium is reached when the suspending threads make an angle of $10^{o}$. Assuming a gravitational force of 9.90 (N/kg) and a negligible mass of the threads, find Q

✓ (Cheng 3-12) Two infinitely long coaxial cylindrical surfaces, r = a and r = b (b > a), carry suirface charge densities $\rho_{sa}$ and $\rho_{sb}$, respectively.

a) Determine $\bar{E}$ everywhere.

b) What must be the relation between a and b in order that E vanishes for r > b?

# Homework

- ✓ (Cheng 3 - 27) What are the boundary conditions that must be satisfied by the electrics potential at an interface between two perfect dielectrics with dielectric constants $\varepsilon_{r1}$ and $\varepsilon_{r2}$?

- ✓ A point charge q is enclosed in a linear, isotropic, and homogeneous dielectric medium of infinite extent. Calculate the $\bar{E}$ field, the $\bar{D}$ field, the polarization vector $\bar{P}$, the bound surface charge density $\rho_{sb}$, and the bound volume charge density $\rho_{vb}$.

- ✓ A very thin, finite and uniformly charged line of length 10 m carries a charge of 10 $\mu$C/m. Calculate the electric field intensity in a plane bisecting the line at $\rho$ = 5m.

- ✓ Show that the magnitude of the electric field intensity of an electric dipole is

$$E = \frac{p}{4\pi\varepsilon_0 r^3}\left[1+3\cos^2\theta\right]^{1/2}$$