

4. Electrostatics with Conductors

Self-test questions

1. The potential difference between two parallel plates with separation d is V . Determine the force per unit area on either plate in terms of d and V .
2. A copper sphere with net charge 0 is placed in an applied field $\mathbf{E}_0 = E_0 \hat{\mathbf{k}}$. Find the complete electric field $\mathbf{E}(\mathbf{x})$ and the surface charge density $\sigma(\theta)$ on the sphere.
3. Calculate the force on a charge q located outside a grounded conducting sphere of radius a .
4. A point charge q is brought near an isolated conducting sphere with charge $2q$. Determine the radial distance at which the force on q is 0.
5. A point charge q is located at $(0, 0, z_0)$ above a grounded conducting sphere of radius a centered at the origin. Determine the total charge on the sphere.