

Chapter 1 - Electric Charges and Fields

In this chapter, we study electric charges, their properties, and how they interact with each other. An electric charge is a fundamental property of matter that causes it to experience a force when placed in an electromagnetic field.

Types of Charges:

There are two types of electric charges - positive and negative. Like charges repel each other, whereas unlike charges attract.

Coulomb's Law:

The force between two point charges is directly proportional to the product of their charges and inversely proportional to the square of the distance between them.

Mathematically, $F = k * (q_1 * q_2) / r^2$

Electric Field:

The region around a charged particle where its influence can be felt is called the electric field. The electric field intensity (E) at a point is defined as the force (F) experienced per unit positive charge (q) placed at that point.

$$E = F / q$$

Field Lines:

Electric field lines are imaginary lines that represent the direction and strength of the electric field. The tangent to a field line gives the direction of the field at that point.

Applications:

- Electric fields are used in capacitors, particle accelerators, and electrostatic precipitators.
- Understanding electric charges helps in designing electrical and electronic systems.

This concludes the basic concept of Electric Charges and Fields.