

## 4.2. Concept of Magnetic Circuits

The fundamental relationships for static electric fields among the field quantities can be summarized as:

$$\nabla \times \vec{E} = 0 \quad (5.1a)$$

$$\nabla \cdot \vec{D} = \rho_v \quad (5.1b)$$

For a linear and isotropic medium,

$$\vec{D} = \epsilon \vec{E} \quad (5.1c)$$

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Similarly for the magnetostatic case

$$\nabla \cdot \vec{B} = 0 \quad (5.2a)$$

$$\nabla \times \vec{H} = \vec{J} \quad (5.2b)$$

$$\vec{B} = \mu \vec{H} \quad (5.2c)$$

It can be seen that for static case, the electric field vectors and magnetic field vectors form separate pairs.

In this chapter we will consider the time varying scenario. In the time varying case we will observe that a changing magnetic field will produce a changing electric field and vice versa.

