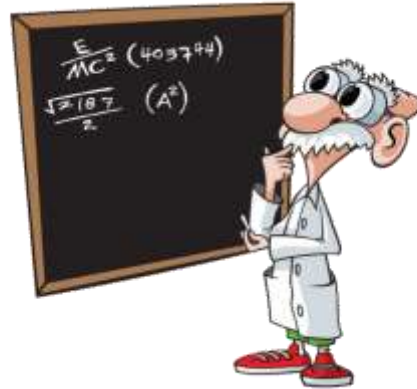


Electromagnetic Field Theory



1. Let's see what the Field is.

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What is Field ?

Lets understand the term “**Field**” first...

A field is a variation of physical state or matter in a certain region of space, essentially generated by some kind of source.

Let's understand the definition through examples....

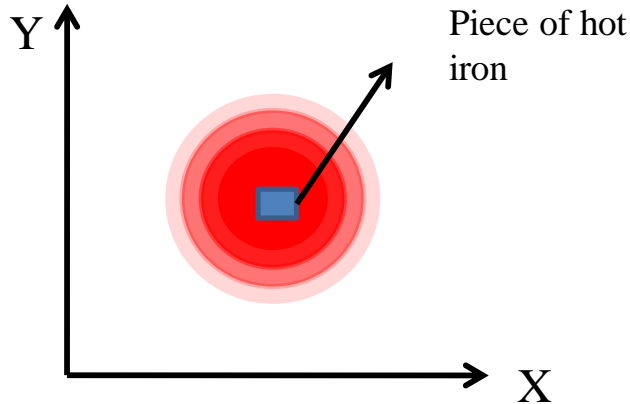


Fig.1 Example 1

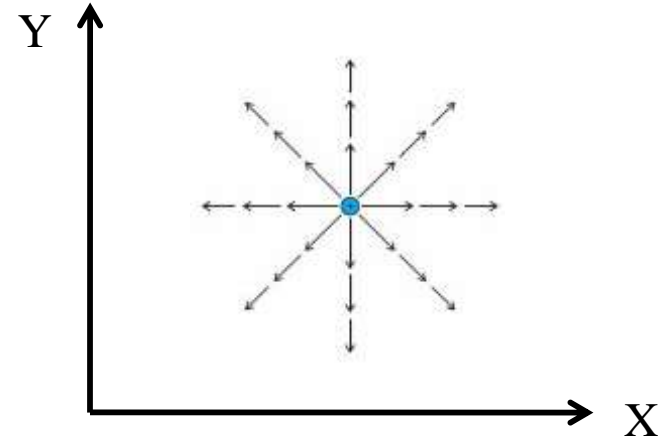


Fig. 2 Example 2

Thus, Fields are two types, i.e.,

1. Scalar Field

2. **Vector Field**

Definition of Scalar Field :-

A region of space contains a scalar field if it is possible to define a number (either real or complex) that expresses a physical quantity in every point of space at every instant of time.

For these fields it is useful to define the equipotential surface, as the surfaces in which the field $f(x, y, z)$ has constant value.

Definition of Vector Field :-

A region of space contains a **vector field if it is possible to define a number (either real or complex) that expresses a physical quantity in every point of space at every instant of time.**

Vector fields are indicated by $\vec{f} = (x, y, z, t)$.

We can say- vector field is a **physical quantity**.

In general, the physical quantities are function of space and time. Thus, to describe the variations of the physical quantities, we must be able to describe all the points of these quantities uniquely in the space.

To define these points we require an appropriate coordinate system.

Thank you