



Electromagnetic waves

Lecture 10

Planar equations for electromagnetic waves

Bashaer Abdulhamza

Araa Hassa

Tow stage

**Department of medical physics
Al-Mustaqbal University-College**

Propagation of Uniform Plane Waves

Plane waves are the simplest type of electromagnetic waves, and the properties of these waves are concentrated in How it reflects, breaks, disperses, and loses energy. To find out how a plane wave propagates in a medium .The propagation shown in Figure (10-1) and what determines the distance or proximity of the distance at which the receiver should be.

In order for this to happen, a mathematical equation that describes the movement of wave propagation in the medium of propagation must be known.

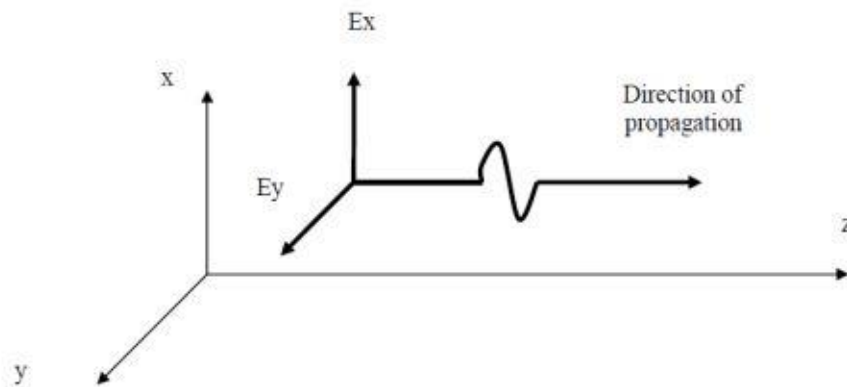


Fig (10-1)

$$\frac{d^2 E_x}{dz^2} - \gamma^2 E_x = 0$$

By solving the above equation, the electric field can be found as a function of the distance and the propagation constant. Thus, the field can be found electricity at any distance. There is also an equation for the magnetic field that can be solved to find the magnetic field at any distance. By finding the electric and magnetic fields at a specific point, the energy at that point can be calculated.

The propagation constant is of great importance because it determines the following propagation wave:

a - The rate of decay in the wave energy. b - the speed of the wave.

This constant depends on the following:

a- Characteristics of the electrical diffusion medium. b - Frequency of the propagated signal.