

The concept of electromagnetic waves and its relation to the concept of light

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The Concept of Electromagnetic Waves and its Relation to the Concept of Light Electromagnetic waves are waves that are generated through the combination of magnetic fields with electric fields. Electromagnetic waves occur in a vertical direction to both electric and magnetic waves and at the same time perpendicular to each other. James Clerk Maxwell was the first scientist to study these kinds of waves together with Heinrich Hertz. James Clerk discovered that the changing of electric fields induces magnetic fields and vice-versa. These waves exist due to a change in these magnetic and electric fields. This process continues for some time until it cannot be absorbed by matter (Horie et al. 169).

Hertz used the theory formulated by Maxwell to come up with the radio waves. Electric charges are surrounded by electric fields. The electric field changes when these charges move to form magnetic fields. Through electromagnetic induction, the changes in the magnetic field create electromagnetic forces, which in turn cause a change in the value of the electric field in a particular region of space. However, this change in an electric field should cause a further change in the magnetic field, which should also cause a further change in the electric field.

Electromagnetic waves are perhaps the most important conclusion arising from the works of Maxwell. Regardless of the frequency or the wavelength of a wave, the wave will always move at a constant speed. The speed of the wave is entirely independent of the manner of its creation. After creation of a wave, the motion of the wave through space depends on the interaction of its electric and magnetic fields. The speed of the wave has no relationship with the physical charge that created it (Giordano 134).

Certain materials can only allow electric field vectors to propagate through them in only one direction. Materials of this type are called polarizer's; they absorb or reflect all waves having electric field vectors that are not aligned to their axis of transmission. In the case where the electric field vector aligned imperfectly with the axis of transmission, it is only possible that the component of the field vector that is along the transmission will go` through the polarizer. The electromagnetic wave is polarized the transmission axis after passing through the polarizer. The most important consideration for the waves is the intensity of the wave rather than the intensity of the magnetic field. The wave's energy is proportional to the square of the vector of the electric field (Horie et al. 111).

In the early 19th century, Thomas Young, an English scientist carried out an experiment known as the double-slit experiment. He was able to demonstrate that when we split a beam of light into two beams, recombining them will reveal interference effects that their only possible explanation is by assuming that light is a wavelike disturbance. The same test repeated using electrons showed that particles have wavelike properties, characteristics conventionally to be those possessed by electromagnetic waves. Maxwell conducted an experiment to calculate an approximate speed at which electromagnetic disturbances are propagated. He found out that this rate is similar to the speed of light; this, therefore, led to him proposing that light is itself a form of electromagnetic radiation (Giordano 45). He suggested that the wavelength of light forms only a small portion of the entire electromagnetic spectrum. Consequently, just like all electromagnetic waves, light travels through a vacuum.

Works Cited

Giordano, Nicholas J. College physics : Reasoning and Relationships.

Belmont, CA: Cengage Brooks-Cole, 2009. Print.

Horie, Kazuyuki, Hideharu, Ushiki, and Winnik. Molecular photonics fundamentals and practical aspects. Tokyo Weinheim Chichester: Kodansha Wiley-VCH, 2000. Print.