

Maxwell's Laws and the Propagation of Light

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Maxwell's theory of propagation of electromagnetic waves is based on the Biot-Savart's law together with its converse law acting simultaneously. That is, it is supposedly based on the formation of a magnetic field by the passage of an electric current and the formation of an electric field by a changing magnetic field. Therefore in order that this model holds, and for the waves to perpetuate (without dissipating in a short interval as water waves do), the magnetic field would need to fluctuate on a continuous basis, while the electric current created by the changing magnetic field moves outwards in a spherical wave. One of the chief difficulties of Maxwell's model is to account for how and why the magnetic field fluctuates.

1. Alternative Model in Conformity with Maxwell's Laws

In this paper we propose an alternative model, which is still in conformity with Maxwell's laws. In this model we view the propagation of an electromagnetic wave as due to dispersion of the charge spherically according to the law $\vec{\nabla} \bullet \vec{E} = \rho/\epsilon_0$ and due to the magnetic field created by the outward motion of the progressively dispersing charge according to the law $\vec{\nabla} \times \vec{H} = \sigma \vec{E}$.

We contend that there are no point charges. A charge is always spread over a surface area. A photon is conceived as an electric dipole consisting of two minute concentric spheres S_1 and S_2 . The outer surface of the inner sphere S_1 has (let us say) a negative charge (while the opposite charges inside this sphere having got cancelled out as in Faraday's charged cage experiment). How the above mentioned outer sphere S_2 has come into being is as follows.

The charge on the inner sphere S_1 has caused a **displacement** in the aether at a unit distance and thus has spontaneously brought about the formation of the outer spherical surface S_2 , and has induced a positive charge on its inner side and a negative charge on the outer side of this surface S_2 . This makes the two charges in between the two spheres S_2 and S_1 to cancel out. (The inner sphere S_1 we started with becomes functionally redundant and therefore disappears). At the same time the charge at the present outer surface S_2 causes a displacement in the aether a unit distance away right round itself spontaneously forming yet another surface S_3 out of aether, and induces charges on either side of this surface. What was formerly the outer sphere S_2 has now become the inner sphere.

This indicates that every time a new sphere is formed on the outside in accordance with Maxwell's principle of displacement of the aether, what stood as the inner sphere becomes extinct and what stood as the outer sphere is transformed into the inner sphere. And it is this process that perpetuates, resulting in the advancement of the charge dispersion in spherical waves at velocity c .

The progressive migration of the charge from surface to surface of ever bigger spheres amounts to passage of a current and it

causes the formation a magnetic field following it, in the surrounding space.

If we consider an instantaneous picture of a moving charge, we would find the resulting magnetic field lines to lie concentrically and such circles of field lines extending to infinity. A picture of such a set of field lines cannot account for electromagnetic waves of a definite wave length. This prompts us to propose that a photon consists not only of an electric dipole, but also that the energy of the photon also has magnetic properties (like molecules having an inherent magnetic moment). It is proposed that in the propagation of the spherical wave as described above, the energy of the photon is not spread uniformly over the whole surface, but this energy is formed into scattered disc-like clumps of definite radius r carrying the dispersing charge and magnetic properties in the agglomeration of these discs. These discs have a spin in the plane perpendicular to the direction of advancement of the charge dispersion at a given point. Hence, we may identify these discs as electromagnetic vortices. And as the charge dispersion advances outwards at velocity c , due to the rotation of the vortices, a point on the periphery of a vortex traces a helix of wave length λ and radius r on the surrounding magnetic field lines. These are transverse waves.

The radius r of a vortex is determined by the energy e of a disc, where $r = \lambda/2\pi$, $\lambda = hc/e$, and $e = E/n$, where n is the number of vortices spread over the spherical surface at any given moment.

2. Explanation of the Cosmological Red Shift

The propagation of the spherical wave is not without dissipation of energy. However because this loss occurs in extremely minute quantities, it is not observable even in the light coming from the stars of our galaxy. But for light coming from other galaxies this dissipation of energy becomes observable. In the face of this loss of energy in order to maintain the advancement of the charge dispersion in the form of spherical waves at the same velocity c , energy is drawn from the rotational motion of the vortices, and this causes the slowing down of their spin. This then manifests in the extension of the wavelength. This is why the more distant a galaxy, the greater the red shift.

3. Conclusion

The special theory of relativity circumvented the explanation of the null result of Michelson-Morley by deeming that aether is non-existent. It found a way to cohabit with Maxwell's equations by asserting that Maxwell's model of propagation of electromagnetic waves by reciprocity of oscillations of electric and magnetic fields can occur in a vacuum. The alternative model developed in the present paper provides a more succinct picture of the

dispersion of the charge on a succession of ever enlarging spheres created by displacement of the aether; and it is in full conformity with Maxwell's laws. Provided that this model is found to be correct, SRT will find itself with the difficulty of explaining how propagation of displacements currents can spontaneously occur in a vacuum. How can a displacement occur if there is no substance of some form to be displaced in a vacuum? Does Einstein's admittance in 1919 of the existence of a certain type of aether ring a bell?