$E=mc^2$ and Maxwell's Fifth Equation
(A Dielectric Solution to $E=mc^2$)

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Abstract. One of Maxwell's original equations was the equation for simple harmonic motion. It will be shown how this equation can be reconciled with the double helix theory of the magnetic field to show that the famous equation $E=mc^2$ is actually a variation of Newton's equation for the speed of sound in a solid.

The Double Helix Theory

I. We saw in 'The Double Helix Theory of the Magnetic Field',

http://www.wbabin.net/science/tombe.pdf

how rotating electron-positron dipoles could be arranged in a double helix fashion to account for the magnetic field. A rotating electron-positron dipole consists of an electron and a positron undergoing a mutual central force orbit such that the rotation axis is perpendicular to a line joining the electron to the positron. If we stack these dipoles on top of each other along their axes of rotation with the electrons placed approximately above the positrons and angularly synchronized in a twisted rope ladder fashion, we will effectively have a helical spring. These helical springs account for the Coulomb tension which runs through magnetic **H** lines of force, and **H** is a measure of the vorticity of the rotating aether within these dipoles. If the rope ladder untwists, the tension will increase because the

electrons will come closer to the positrons above and below them. See Figure 1 below,
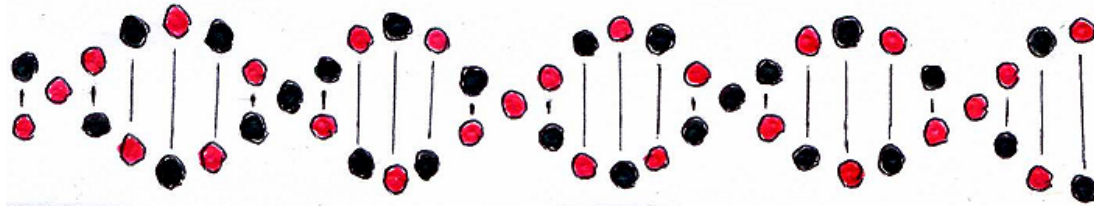

Figure 1. A close-up view of a single magnetic line of force. The electrons are shown in red and the positrons are shown in black. The double helix is rotating about its axis with a prodigious angular speed and the rotation axis represents the magnetic field vector H. The diagram is not to scale as the relative dimensions remain unknown.

The dipoles in adjacent **H** field lines will be aligned in their mutual equatorial planes and the mutual tangential velocities existing between these adjacent dipoles will cause a centrifugal repulsion to act laterally between **H** lines. This centrifugal repulsion accounts for both ferromagnetic and electromagnetic repulsion.

Maxwell's Fifth Equation

II. Equation (105) in part III of Maxwell's 1861 paper 'On Physical Lines of Force' [1],

http://vacuum-physics.com/Maxwell/maxwell_oplf.pdf

is the equation for simple harmonic motion. This same equation is listed again as equation (E) in part III of his 1865 paper 'A Dynamical theory of the Electromagnetic Field' [2]. It is the fifth of the original eight 'Maxwell's Equations'. In the 1861 paper it appears in the form,

$R = -4\pi K^2 h$ **(Electric Displacement Equation)**   (105)

This equation (105) was of crucial importance in enabling Maxwell to ascertain that light is an electromagnetic wave that propagates in a dielectric solid, and it was the foundation stone for his famous 'Displacement Current'.

R refers to electromotive force and it is simply mass times acceleration. K^2 is the dielectric constant, and h is displacement. (The symbol K^2 has

been chosen here where Maxwell actually used the symbol E². The reason is to avoid confusion with the letter E for energy)

The only way that we can reconcile equation (105) with the double helix arrangement of Faraday's lines of force is to consider the simple harmonic motion to exist by virtue of a one dimensional projection of the circular motion of an electron or a positron along a diameter in a rotating electron-positron dipole. In this case the kinetic energy of an electron or a positron will equal its maximum kinetic energy as viewed in one dimension along a diameter. Using mechanical spring theory and considering the electron and the positron to be at each end of the spring, the total maximum kinetic energy will be equal to the maximum potential energy of the stretched spring. Using classical expressions for energy, we obtain the equation,

$$mv^2 = 2\pi K^2 h^2 \tag{2}$$

where h is the radius of the rotating dielectric unit and where m is the average mass of an electron and a positron. The factor of one half has vanished on the left hand side of equation (2) because it is the sum of two kinetic energies. On the right hand side of equation (2), the factor of two is one half of the original factor of four in equation (105) since the expression for potential energy stored in a spring involves a factor of one half.

It is a fact of inverse square law central force orbital theory that in order for an object in circular orbit to obtain its escape velocity, it needs to receive an amount of energy equal to the kinetic energy that it already possesses. If the circumferential velocity of the above rotating dielectric pair is equal to 1.4 times the speed of light c, then it follows that the liberation energy that is required to liberate an electron and a positron from such a rotating dielectric pair will be,

$$E = 2mc^2 \tag{3}$$

where E is the liberation energy and corresponds to the energy of a gamma ray photon of 1.02MeV [3]. The famous equation $E = mc^2$ therefore refers to the binding energy of an electron or a positron in the luminiferous medium [4].

From (2) and (3) it follows that,

$$mc^2 = \pi K^2 h^2 \tag{4}$$

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and hence K² has got the dimensions of energy per unit area. If we write mass m as the product of the areal density μ and the surface area of the rotating dielectric πh², the area terms will cancel out and we will be left with,

$$c^2 = K^2/\mu \quad \textbf{(Newton's Equation for the Speed of Sound)} \quad (132)$$

which is equations (132) to (135) in part III of Maxwell's 1861 paper.

There were allegations by a nineteenth century French scientist by the name of Pierre Duhem, that Maxwell cheated by using equation (132), and that he should have included a factor of one half in the numerator on the right hand side. This allegation appears to be groundless when Maxwell's fifth equation is considered in the light of the rotating electron-positron dipole. Maxwell was able to substitute data obtained in 1856 by Weber and Kohlrausch into the Newton equation (132) above and obtain the speed of light.

On doing so, Maxwell stated " - - - *we can scarcely avoid the inference that light consists in the transverse undulations of the same medium which is the cause of electric and magnetic phenomena - - - "*

Conclusion

III. The significance of making the circumferential velocity of the rotating dielectric units to be 1.4 times the speed of light is that these dielectric units then become the prototype alternating currents with root mean square speed exactly equal to the speed of light. Based on the above considerations, it would seem that light is the propagation of angular acceleration through a solid that is comprised of fundamental rotating units. The famous equation $E = mc^2$ therefore originates with Newton's equation for the speed of sound and with Maxwell's forgotten fifth equation regarding electric displacement. It refers to the binding energy of an electron or a positron in the above luminiferous solid.

References

[1] Clerk-Maxwell, J., "On Physical Lines of Force", Philosophical Magazine, Volume 21, (1861)

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[3] See Dr. Menahem Simhony's interpretation of the 1932 electron pair production experiment at,

http://web.archive.org/web/20040606235138/www.word1.co.il/physics/mass.htm

[4] The fact that an electron and a positron have escaped from each other doesn't automatically mean that they have escaped from the electron-positron sea as a whole. However, when we consider that the electric sea is bonded into a solid by virtue of an equilibrium between inverse square law attractive forces in the axial plane of the dipoles and centrifugal repulsive forces in the equatorial plane, then it is likely that these two effects will cancel each other as regards binding energy relative to the electric sea as a whole. In other words, the solenoidal bonding mechanism probably ensures that $E = mc^2$ is the exact amount of energy required by an electron or a positron to escape totally from the electric sea.