

## A Short Note on the Nature of Light

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**Abstract.** Maxwell's equations are an extrapolation into outer space, of the equations of electromagnetism that were originally established in connection with laboratory electric circuits. In outer space, however, no source electric circuits, as would be required to give meaning to the terms in the equations, are considered to exist. This discrepancy is of course resolved by virtue of the fact that Maxwell developed his equations on the basis that space is densely populated with tiny aethereal vortices, which in effect serve as miniature electric circuits within which the equations of electromagnetism that are contributory to the electromagnetic wave equations, can be applied. This article will examine the deeper nature of a ray of starlight in outer space, in the narrowest context that is physically possible within the framework that Maxwell's sea of aethereal vortices serves as the medium for the propagation of such waves.

### Light Rays on the Smallest Scale Possible

I. In a steady state magnetic field, if we treat Maxwell's tiny aethereal molecular vortices, [1], as rotating electron-positron dipoles, [2], [3], then these will be aligned along their mutual rotation axes, so that magnetic lines of force constitute vortex rings around the source electric current, and these vortex rings are threaded by a double helix structure of electrons and positrons. If electrons are aether sinks and positrons are aether sources, where the aether is a fundamental electric fluid from which everything is made, then there will be a bi-directional flow of electric fluid within magnetic field lines, between the positrons and the electrons along the axial direction, with no net flow in any one direction. Fig. 1 below illustrates a close-up view of a single magnetic field line.

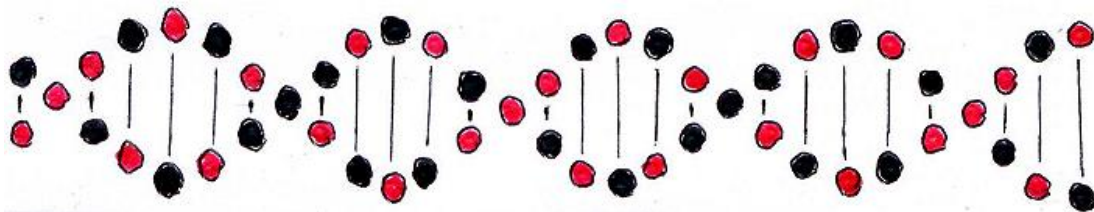


Fig. 1. A single magnetic field line comprised of a double helix of rotating electron-positron dipoles. The vertical lines marked in the diagram represent the equatorial planes of these dipolar vortices, and due to centrifugal force and the fact that the aether (electric fluid) can't pass through itself, then, **when in the steady state**, no electric fluid crosses between the electrons and positrons at right angles to the field lines. In the axial direction, however, there is a mutually cancelling bi-directional flow. A ray of light can, however, cross such magnetic lines of force at any angle. The precession of the vortices when in the dynamic state, allows for the electric fluid to pass between neighbouring vortices at any angle, irrespective of their default alignment when in the steady state, and it is this net flow of electric

fluid that constitutes EM radiation. EM radiation is therefore a relay of tiny electric currents in space, [6], and these electric currents are what gives rise to radiation pressure.

When it comes to a ray of light propagating through a magnetic field, there will be a net flow of pressurized aether accompanying the wave, and it won't matter what the orientation is, as between the ray of light and the prevailing magnetic field direction. The essence of an EM wave is the net swirling of aether from the positron of one electron-positron dipole into the electron of its immediate neighbour along the line of the ray, [4], [5]. This occurs when a dipole is induced to precess, and this has a knock-on effect, meaning that EM radiation is simply a relay of tiny electric currents, travelling at the average speed that aether (electric fluid) travels between a source and a sink, much as in the case of the very same electric fluid travelling from source to sink along the conducting wire in a terrestrial electric circuit or a transmission line. See, "*A Short Note on the Nature of Electric Current*", [6].

Laser beams tell us that light can be very coherent, but even they diverge to some extent. Meanwhile, it is proposed that the narrowest ray of light possible follows a single track of electron-positron dipoles, and hence it is totally coherent. On the issue of electron-positron pair annihilation, when a positronium atom decays in space, it merely bonds into the all-pervading background sea of rotating electron-positron dipoles, setting up two equal and opposite pulses of EM radiation in the gamma frequency, [7], [8].

## Maxwell's Equations

**II.** The conclusion in Section **I** above is reasoned on the basis that the magnetic vector potential,  $\mathbf{A}$ , is the circumferential momentum density of Maxwell's tiny molecular vortices, where the vorticity,  $\nabla \times \mathbf{A} = \mathbf{B}$ , indicates the direction of the prevailing magnetic field lines when the vortices mutually align along their rotation axes. Since the  $\mathbf{E}$  field of time-varying EM induction is  $\mathbf{E}_{\mathbf{K}} = -\partial \mathbf{A} / \partial t$ , this means that  $\mathbf{E}_{\mathbf{K}}$  is a torque, and so EM radiation must involve a precession of the vortices. This precession, however, needs to be induced by pressurized aether coming from the immediately neighbouring vortex, while the precession in turn alters the inflow and outflow rates so as to propagate the net aether flow to the next vortex along the line, causing it to precess and the cycle to repeat indefinitely. In the dynamic state,  $\mathbf{A}$  represents Maxwell's displacement current as the electric fluid passes between immediately neighbouring vortices.

## References

- [1] Clerk-Maxwell, J., "*On Physical Lines of Force*", Philosophical Magazine, vol. XXI, Fourth Series, London, (1861)  
[http://vacuum-physics.com/Maxwell/maxwell\\_oplf.pdf](http://vacuum-physics.com/Maxwell/maxwell_oplf.pdf)

[2] Tombe, F.D., *“The Double Helix Theory of the Magnetic Field”*, (2006)  
Galilean Electrodynamics, vol. 24, Number 2, p.34, (March/April 2013)  
<http://gsjournal.net/Science-Journals/Research%20Papers-Mathematical%20Physics/Download/6371>

[3] Tombe, F.D., *“The Double Helix and the Electron-Positron Aether”*, (2017)  
[https://www.researchgate.net/publication/319914395\\_The\\_Double\\_Helix\\_and\\_the\\_Electron-Positron\\_Aether](https://www.researchgate.net/publication/319914395_The_Double_Helix_and_the_Electron-Positron_Aether)

[4] Lodge, Sir Oliver, *“Ether (in physics)”*, Encyclopaedia Britannica, Fourteenth Edition, vol. 8, pp. 751-755, (1937)  
<http://gsjournal.net/Science-Journals/Historical%20PapersMechanics%20/%20Electrodynamics/Download/4105>

See pp. 6-7 in the pdf file in the link above, beginning at the paragraph that starts with, *Possible Structure.* –, and note that while the quote suggests that the ether is incompressible, this is almost certainly not the case. The quote in question, in relation to the speed of light, reads,

*“The most probable surmise or guess at present is that the ether is a perfectly incompressible continuous fluid, in a state of fine-grained vortex motion, circulating with that same enormous speed. For it has been partly, though as yet incompletely, shown that such a vortex fluid would transmit waves of the same general nature as light waves— i.e., periodic disturbances across the line of propagation—and would transmit them at a rate of the same order of magnitude as the vortex or circulation speed”*

[5] Tombe, F.D., *“Wireless Radiation Beyond the Near Magnetic Field”*, (2019)  
[https://www.researchgate.net/publication/335169091\\_Wireless\\_Radiation\\_Beyond\\_the\\_Near\\_Magnetic\\_Field](https://www.researchgate.net/publication/335169091_Wireless_Radiation_Beyond_the_Near_Magnetic_Field)

[6] Tombe, F.D., *“A Short Note on the Nature of Electric Current”*, (2024)  
[https://www.researchgate.net/publication/378793537\\_A\\_Short\\_Note\\_on\\_the\\_Nature\\_of\\_Electric\\_Current](https://www.researchgate.net/publication/378793537_A_Short_Note_on_the_Nature_of_Electric_Current)

[7] Simhony, M., *“The Electron-Positron Lattice Space, Cause of Relativity and Quantum Effects”*, Physics Section 5, The Hebrew University, Jerusalem, (1990)  
<http://web.archive.org/web/20040606235138/www.word1.co.il/physics/mass.htm>

[8] Tombe, F.D., *“The Positronium Orbit in the Electron-Positron Sea”*, (2020)  
[https://www.researchgate.net/publication/338816847\\_The\\_Positronium\\_Orbit\\_in\\_the\\_Electron-Positron\\_Sea](https://www.researchgate.net/publication/338816847_The_Positronium_Orbit_in_the_Electron-Positron_Sea)