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Displacement Current 2

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Abstract. When the electromagnetic wave equation is derived in modern textbooks, Maxwell's displacement current is used. This article examines how we can justify Maxwell's displacement current.

Electric Current and Gravity

I. Electric current is aether momentum **A**, better known as the magnetic vector potential. **A** is the same thing as current density **J**. In an electric circuit, the current is a pressurized flow of aether that behaves according to Bernoulli's principle. The pressure is the charge, and the flow is the kinetic energy. Gravity is an all pervasive radial electric current which constitutes a rarefied flow of aether that gives rise to a tension, and hence to a pull force.

An electric current will polarize a dielectric, but it is the actual aether flow and not the reactive linear displacement of the particles that causes the magnetic field. That is one reason why displacement current cannot be justified on the basis of linear polarization of a dielectric.

When we derive the electromagnetic wave equation, we are working on the premises that **E** will equal $-\partial\mathbf{A}/\partial t$ as per Faraday's law. As such,

$$\partial\mathbf{E}/\partial t = -\partial^2\mathbf{A}/\partial t^2 \qquad \textbf{(1)}$$

We will now look at equation **(1)** in relation to Ampère's Circuital Law. Ampère's Circuital Law is,

curl $\mathbf{B} = \mu\mathbf{J} = \mu\mathbf{A}$ **(Ampère's Circuital Law)** **(2)**

If we accept that,

$\mathbf{J} = \varepsilon\partial\mathbf{E}/\partial t$ **(Displacement Current)** **(3)**

then it follows from **(1)**, **(2)**, and **(3)** that,

$\mathbf{A} = -\varepsilon\partial^2\mathbf{A}/\partial t^2$ **(4)**

This is a simple harmonic equation in which ε is the inverse of the spring constant.

Displacement current can therefore be justified on the grounds of the existence of some kind of oscillatory disturbance in the aether, with the electric permittivity ε being related to the elasticity.

It further follows that since,

curl $\mathbf{A} = \mathbf{B}$ **(Maxwell's Second Equation)** **(5)**

and since,

curl $\mathbf{B} = \mu\mathbf{A}$ **(Ampère's Circuital Law)** **(2)**

that we are dealing with interlocking solenoidal lines of electric current and magnetic force at every point in space. This state of affairs could only come about if the aether where to be rendered into a state of tiny vortices as per Bernoulli, Maxwell and Tesla.

This leaves us to choose between linear displacement of the vortices or angular displacement. Since the divergence of a curl is always zero, then we don't want electromagnetic radiation to involve radial forces. This rules out linear polarization. At any rate, linear polarization has a blocking effect on the flow of electric current which causes a build up of aether pressure (the capacitor effect). Electromagnetic radiation is an unobstructed flow of aether, and from the above considerations we can conclude that it is a fine-grained vortex flow of aether in which the speed is determined by the density μ and the elasticity 1/ε of the vortex sea.

Without a sea of tiny aethereal vortices, it is impossible for the textbooks to justify Maxwell's displacement current. The previous article 'Displacement Current' at,

http://www.wbabin.net/science/tombe47.pdf

explained how the existing modern textbook derivations are heavily flawed.

The Electromagnetic Wave Equation

II. In order to confirm that the magnetic vector potential **A** and the current density **J** are one and the same quantity, we will treat them as such and derive the electromagnetic wave equation accordingly. Combining equations **(2)**, **(4)**, and **(5)**, we obtain,

$$\text{curl}\,(\text{curl}\,\mathbf{A}) = -\mu\varepsilon\partial^2\mathbf{A}/\partial t^2 \qquad \textbf{(6)}$$

This expands to,

$$\nabla(\nabla.\mathbf{A}) - \nabla^2\mathbf{A} = -\mu\varepsilon\partial^2\mathbf{A}/\partial t^2 \qquad \textbf{(7)}$$

If we take the divergence of **A** to be zero ($\nabla.\mathbf{A} = 0$), this will reduce to a wave equation for disturbances in the aether such that the propagation speed will be exactly equal to the speed of light. This would be the state of affairs that would occur when we are considering a fine-grained vortex flow through a sea of tiny aether whirlpools. In such a case, the motion of the aether would always be tangential to the vortices, and hence the divergence of the aether momentum **A** would always be zero.

The Telegraphy Equation

III. Electromagnetic radiation should not be confused with the transverse electric waves which propagate in the space between the two wires of a transmission line. Linear polarization between the wires will impede the flow of aether in that direction, and so the aether will continually move sideways and parallel to the wires in order to circumvent the blockade. These telegraphy waves will probably involve both Gauss's law and the equation of continuity of charge, which will mean that we can't guarantee that the divergence of **A** will be zero. This fact, along with the fact that cable telegraphy waves are usually propagating in a dielectric material other than the pure electron-positron sea, means that it becomes more difficult to theoretically predict what their speed should be. However, the involvement of the electron-positron sea at some level, along with its associated density, will probably ensure that the speed in question is in the order of the speed of light.