Magnetic Repulsion and Centrifugal Force

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Abstract. **James Clerk-Maxwell suggested that magnetic repulsion is caused by centrifugal force acting between tiny molecular vortices that fill all space. In this article, Maxwell's molecular vortices are considered more accurately to constitute rotating electron-positron dipoles, and the electromagnetic wave equation is derived from the angular momentum of such a dipole without using Faraday's law, electric charge, or Maxwell's displacement current. The derivation involves a magnetic field vector H which takes an inverse power law of unity from the standard expression for the curl of a velocity. This is in contradiction to the standard Biot-Savart law which uses an inverse square law, but the discrepancy is accounted for by the usage of *'displacement'* instead of electric charge. It is then suggested that magnetic repulsion closely follows the inverse cube law of centrifugal force.**

Centrifugal Force

I. As the ship pulls into the harbour, a mooring line is seen to fly a considerable distance from a lower deck to the wharf. The lower deck has a low ceiling and it's hard to imagine how somebody could have thrown the mooring line so far from such a confined space. The answer lies in centrifugal force. Everybody knows that when we swirl an object around on the end of a rope and let go, that the object flies off at a tangent. But what is not so often realized is that this phenomenon can be utilized in connection with a small radius and a high tangential speed to produce a high speed radial projectile, especially when the projectile is released forty-five degrees past the lowest point of a vertical circular motion. The act of working the projectile up to a high tangential speed is equivalent to winding the system up with centrifugal potential energy. When released, the projectile flies away both radially and tangentially, and when the travel distance is compared with the radius of the original constrained circular motion, it becomes clear that the radial motion after release is considerably more significant than the tangential motion.

We can however look at this phenomenon in a more blinkered manner using displacement vectors, and then deny that centrifugal potential energy exists. We can refer to the centrifugal potential energy by the alternative name of rotational kinetic energy, and when the mooring line is released we can say that it flies off at a tangent and follows its inertial path. We can refuse to look at the centrifugal

pressure that is inherent in the inertial path and which shows up when we analyze the motion using position vectors. But is such a denial of centrifugal force satisfactory in general when we wish to consider the astronomical and the microscopic scales? Centrifugal force is a radial inverse cube law repulsion that arises in a Keplerian orbit, and it becomes undeniable when extrapolated into the four body problem of two two-body orbits sitting adjacent to each other, because it visibly causes the two orbits to repel each other. This adjacent vortex scenario is the basis upon which James Clerk-Maxwell attempted to explain magnetic repulsion.

Angular Momentum and EM Radiation

II. According to James Clerk-Maxwell [1], space is densely packed with tiny molecular vortices that are pressing against each other with centrifugal force. In fact, large scale centrifugal force is a pressure differential that arises perpendicular to motion through Maxwell's sea of molecular vortices, while transverse Coriolis force is the perpendicular deflection that arises due to motion across a vorticity gradient in a pressure equilibrium. These tiny vortices are constrained from dilating, and so for the purposes of magnetization we will consider that they are totally circular. Any linear stretching of these vortices comes under the preserve of linear polarization, electrostatics, and cable telegraphy, and not under the preserve of electromagnetism. It has been one of the greatest monumental blunders of modern times to treat cable telegraphy using the equations of electromagnetism. Electromagnetic radiation is a wireless affair which is all about the increase in pressure that arises with fine-grained angular acceleration. In "The Double Helix Theory of the Magnetic Field" [2], it was explained how Maxwell's molecular vortices are more accurately represented by rotating electron-positron dipoles. See Fig. 1 below,

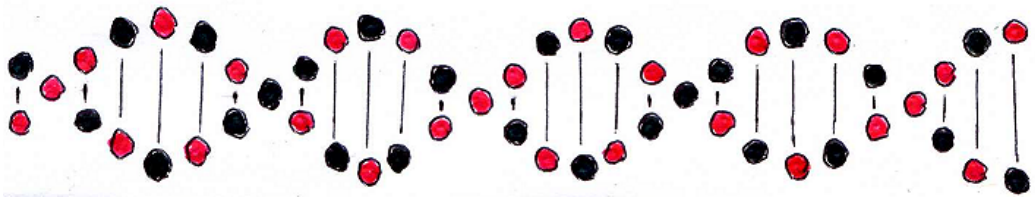

Fig. 1 Close-up view of a single magnetic line of force. The electrons are shown in red and the positrons are shown in black. The double helix is rotating about its axis with a prodigious angular speed, and the rotation axis represents the magnetic field vector H. The diagram is not drawn to scale since the relative dimensions remain unknown, but it can be assumed that the particles are spaced approximately equidistant in the order of picometres in all directions, hence forming a dense dielectric sea.

The circumferential velocity **v** of the electrons and positrons leads to the equation,

$$\text{curl } \mathbf{v} = \mathbf{H} \qquad \textbf{(1)}$$

where **H** is vorticity. Let's consider the vorticity **H** in a single rotating electron-positron dipole to be related to the angular momentum per surface area by the equation,

$$\mathbf{H} = 3(\mathbf{r}\times\mathbf{v})/4\pi r^2 \qquad \text{[compare with the Biot-Savart Law]} \qquad \textbf{(2)}$$

where **r** is radial displacement. If we define the vector **D** as $3\mathbf{r}/4\pi r^2$, equation **(2)** simplifies to,

$$\mathbf{H} = (\mathbf{D}\times\mathbf{v}) \qquad \textbf{(3)}$$

The divergence of **H** will be zero, not because of the superficial inverse square law in **D**, but because **H** is a solenoidal axial vector which is the curl of **v**. The only monopoles involved in magnetism are the electric monopoles that wind around each magnetic line of force in a double helix. Ampère's circuital law is obtained by taking the curl of **H**,

$$\text{curl } \mathbf{H} = \mathbf{v}(\text{div } \mathbf{D}) - \mathbf{D}(\text{div } \mathbf{v}) + (\mathbf{v}.\text{grad})\mathbf{D} - (\mathbf{D}.\text{grad})\mathbf{v} \qquad \textbf{(4)}$$

The last three terms on the right hand side of equation **(4)** vanish because **v** is a transverse vector perpendicular to **D**, and **v** is not a vector field. In the first term on the right hand side of equation **(4)**, the divergence of **D** is $3/4\pi r^2$ or $3r/4\pi r^3$ and this corresponds to a '*displacement density*' which we will denote by the symbol μ. Hence we are left with,

$$\text{curl } \mathbf{H} = \mu\mathbf{v} = \mathbf{J} \qquad \text{[Ampère's Circuital Law]} \qquad \textbf{(5)}$$

There is no explicit mention here of the concept of electric charge. Electric charge is simply taken to be the density or pressure of vitreous space (aether). When a dipole is subjected to a simple harmonic angular acceleration, the circumferential velocity **v** will obey the relationship,

$$\mathbf{v} = -\varepsilon\partial^2\mathbf{v}/\partial t^2 \qquad \textbf{(6)}$$

where ε is the elasticity factor †. Hence substituting equation **(6)** into equation **(5)** leads to,

$$\text{curl } \mathbf{H} = -\mu\varepsilon\partial^2\mathbf{v}/\partial t^2 \qquad \textbf{(7)}$$

Taking the curl of equation **(7)** and using equation **(1)** we obtain,

$$\nabla^2\mathbf{H} = \mu\varepsilon\partial^2\mathbf{H}/\partial t^2 \qquad \text{[wave equation]} \qquad \mathbf{(8)}$$

Although Maxwell simply defined the density μ to be unity in air, he established a theoretical equality between the ratio of density and elasticity to the ratio of electromagnetic to electrostatic units of charge. The latter ratio was determined experimentally by Weber and Kohlrausch in 1856 using a discharging capacitor and it linked directly to the measured speed of light ‡. Electromagnetic waves are therefore a propagation of angular acceleration or precession through a sea of tiny aethereal vortices, and these undulations correspond to oscillations in either centrifugal pressure or axial Coriolis pressure. These pressure oscillations are in turn caused by an excess outflow and inflow of vitreous aether from positrons into electrons. Electromagnetic radiation hence constitutes a net flow of pressurized aether which accounts for the speed and the linear momentum. The speed will of course be related to the average speed that the aether flows from the positrons to the electrons. As such, electromagnetic radiation should not be confused with propagating pressure pulses within the aether itself. The 1937 Encyclopaedia Britannica article on 'Ether' discusses its structure in relation to the cause of the speed of light. It says, *"POSSIBLE STRUCTURE.__ The question arises as to what that velocity can be due to. 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 order of magnitude as the vortex or circulation speed - - - -"*

† This derivation of the electromagnetic wave equation does not involve Maxwell's displacement current. The vital ingredients of displacement current are nevertheless found in equation **(6)** but perpendicular to displacement current. This reflects the inability of modern physics to distinguish between magnetization (rotational) and linear polarization (irrotational), and hence an inability to distinguish between that which radiates wirelessly from the side of an electric wire and that which moves along in the space between two electric wires (cable telegraphy). The situation is of course not helped by the denial of the existence of the very medium which becomes magnetized and/or linearly polarized.

‡ The discharging capacitor experiment for determining electric permittivity has now been purged from most modern textbooks in favour of a defined electric permittivity, even though the defined value is obtained using an equation which arose in the first place because of the measured value.

Magnetic Repulsion

III. Magnetic lines of force spread outwards and away from each other in the space between two like magnetic poles. Hence the lines of force from each pole

come together laterally, and the repulsion is caused by the centrifugal pressure in the equatorial plane of the electron-positron dipoles that make up the lines of force. Inside an electron-positron dipole the centrifugal force is merely the monopole pressure field which increases with angular acceleration. The dipoles are like rotating pump handles which screw out the pressurized vitreous electricity. If however we move beyond an electric circuit or a bar magnet in the equatorial plane of the solenoidally aligned sea of electron-positron dipoles, the repulsive force will be attributable to the dipole field, and it should therefore take on an inverse cube law relationship just like centrifugal force on the large scale. As such, in relation to magnetic repulsion, the Biot-Savart law should more properly contain an inverse cube law relationship to the extent that it applies at all. Solenoidal field lines around an electric circuit or a bar magnet will not extend indefinitely and so it is hard to imagine that the Biot-Savart law will apply beyond that finite extent. Magnetic levitation does occur and it should not really be a mystery even if we are to accept the orthodox teaching that magnetic repulsion obeys an inverse square law. The points of origin of the gravitational and magnetic fields are different and so the question of Earnshaw's Theorem **[3]** should never have been a problem as regards the issue of magnetic levitation. At any rate, it is highly probable that magnetic repulsion obeys some kind of non-analytical law which approximates more closely to the inverse cube law of centrifugal force.

References

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