Centrifugal Force in the Electric Circuit

Frederick David Tombe,
Belfast, Northern Ireland, United Kingdom,
sirius184@hotmail.com
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Abstract. The centrifugal force is heavily involved in electromagnetism. It is involved in the magnetic force that acts on a current carrying wire and it is also involved in the electromotive force that induces an electric current in a wire that is moving in a magnetic field. In the former case it is a simple centrifugal force of the kind that keeps the planets in orbit, whereas in the latter case it is a compound centrifugal force which bears close similarities to the transverse Coriolis force that acts in non-circular planetary orbits and in all vortex phenomena.

Centrifugal Force

I. Centrifugal force is an integral aspect of Euclidean geometry. The transverse motion of every object relative to any point in space will induce a radial centrifugal repulsive force of the form m$\mathbf{v}\times\boldsymbol{\omega}$ where $\mathbf{v}$ is the linear velocity and $\boldsymbol{\omega}$ is the angular velocity relative to that point. Kepler's areal constant can be substituted into the expression m$\mathbf{v}\times\boldsymbol{\omega}$ to show that the centrifugal force obeys an inverse cube law relationship. Since the inverse cube law is associated with a dipole field we might therefore conclude that an electric dipole exists at every point in space. The link between the $\mathbf{v}\times\mathbf{B}$ force in electromagnetism and the centrifugal force can be seen by extrapolating centrifugal force to the situation which occurs in the four body problem as between two adjacent closed orbital systems. In particular we will consider the case of two adjacent electron-positron dipole orbits that are aligned in their mutual equatorial plane and each rotating in the same direction. The centrifugal force acting between the two electron-positron dipoles, due to the mutual circumferential speeds, will cause a mutual repulsion. This is the basis upon which Maxwell explained the magnetic repulsion that exists laterally between Faraday's lines of force, and it leads us to suspect that centrifugal force is rooted in aether pressure. Maxwell used the concept of tiny molecular vortices that are aligned solenoidally along their mutual rotation axes to explain the magnetic field. Rotating electron-positron dipoles, in which the electrons act as aether sinks and the positrons act as aether sources, will now be considered to be a more focused picture of Maxwell's

molecular vortices. If we further consider that vorticity is rotational stress in the aether, and that vorticity widens the positron sources and tightens the electron sinks, then it follows that angular acceleration of an electron-positron dipole will induce aether pressure. This is the ultimate basis of both Lenz's law and centrifugal force.

Gravity is a large scale monopole field which exists due to the aether tension that arises in connection with the flow of aether into sinks. Hence gravity is an inverse square law force field. In large bodies that are undergoing linear motion, gravity will entrain an extended region of the electron-positron sea beyond the body itself. This entrained region shall be called the gravitosphere. Where two such gravitospheres meet in a state of relative motion, there will be aether vorticity generated between the electron-positron dipoles at the shear region. This will generate a cushion of excess centrifugal repulsion which will allow the two gravitospheres to hover over each other with minimal friction and to repel each other at right angles to their directions of motion. Large scale centrifugal force is induced at right angles to the direction of motion as per the formula $\mathbf{F} = m\mathbf{v}\times\boldsymbol{\omega}$, and the speed $\mathbf{v}$ in that formula may be constant. But a large object with a constant transverse speed will actually be causing a transverse force and hence a torque to act on the surrounding electron-positron dipoles. The fact that gravity is an inverse square law force, whereas centrifugal force is an inverse cube law force accounts for the stability of the planetary orbits. Centrifugal force on the large scale is an electromagnetic effect which propagates at the speed of light, whereas gravity is a pure aethereal effect whose propagation speed may even be infinite.

Centrifugal force is totally denied in modern physics. It has been purged from many textbooks over the last fifty years, possibly because of its implications regarding absolute motion, and the associated threat which that would pose to Einstein's theories of relativity. Rotating frames of reference have been introduced into the topic like a hall of mirrors in order to confuse the issue. This has led to the erroneous belief that centrifugal force is something that only exists in a rotating frame of reference, and that as such, it is only fictitious. Many physicists have been fooled into believing that an observer has to be actually rotating with the radial line in order to be able to observe the induced outward radial acceleration. This is the same as saying that we need to actually be rotating inside a centrifuge machine in order to see it operating. While trying to deny centrifugal force as a reality, modern physicists use various methods. The centrifugal force term, $mr\omega^2$, which appears in the planetary orbital equation, is often hidden inside a vector box called

'radial acceleration' and the name 'centrifugal force' is denied for the $mr\omega^2$ term inside that box. Another method of denial is to retreat into Cartesian coordinates in an attempt to avoid any recognition of the $mr\omega^2$ term which is expressed in polar coordinates. It's like as if they believe that a real effect is going to disappear simply by using a different and more cumbersome language of description.

This denial of centrifugal force has a very negative effect on the credibility of Maxwell's original papers, because Maxwell depended heavily on the very real centrifugal pressure in his sea of molecular vortices in order to explain important magnetic effects. Centrifugal force is in fact a very real outward radial expansion that can lead to pressure and potential energy, and the effect is utilized in many engineering devices.

The Force on a Current Carrying Wire

II. In his 1861 paper 'On Physical Lines of Force', James Clerk-Maxwell used the equation $\mathbf{F} = \mathbf{v}\times\mathbf{B}$ to explain the force on a current carrying wire in conjunction with his sea of molecular vortices.[1] It will be assumed that Maxwell's sea of molecular vortices was an unfocused picture of the electric sea of rotating electron-positron dipoles. **B** is equal to $\mu\mathbf{H}$ where **H** refers to the circumferential speed and hence to the vorticity of the vortices. The magnetic permeability μ is the areal density of the rotating electron-positron dipoles, and hence **B** is the magnetic flux density. Maxwell considered **H** to be the intensity of the magnetic force. Maxwell did not overtly use the concept of electric charge in his 1861 paper.

Although the $\mathbf{v}\times\mathbf{B}$ term is nowadays heavily associated with the name of Lorentz, Maxwell's 1861 paper was written when Lorentz was still a young boy. Maxwell's explanation for $\mathbf{F} = \mathbf{v}\times\mathbf{B}$ is in terms of centrifugal force. A current carrying wire is surrounded by a solenoidal alignment of aether vortices (rotating electron-positron dipoles) which control the aether pressure inside the wire by centrifugal repulsion. This solenoidal alignment prevents the escape of the high pressure aether (or vitreous fluid) that is associated with the electric current in the wire. Maxwell argued that when a current carrying wire is placed at a certain orientation within a magnetic field, superimposition of the current's own magnetic field will result in a greater centrifugal pressure at one side of the wire which will then cause a net force to act at right angles to the direction of the current. It would seem therefore that the $\mathbf{F} = \mathbf{v}\times\mathbf{B}$ force is a

centrifugal force with **H** referring to the angular velocity of the electron-positron dipoles that are pushing against the wire from the surrounding electric sea.

In actual fact, this situation only occurs when the force in question is an attractive force. As such, it will be supplemented by a Coulomb tension running along the axes of the double helix alignment of the electron-positron dipoles which constitute the magnetic lines of force, and which connect directly between the two attracting objects, pulling them together as like with helical springs. See fig. 1 below for a diagram of a single magnetic field line,

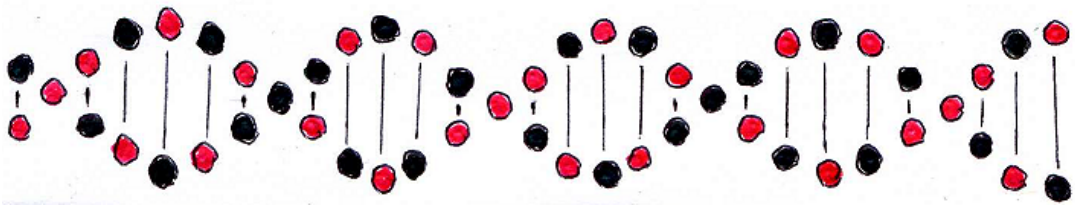

Fig. 1 A close-up view of a single magnetic line of force. The electrons are shown in red and the positrons are shown in black. The double helix is rotating about its axis with a prodigious angular speed and the rotation axis represents the magnetic field vector H. The diagram is not to scale as the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

In the case of a repulsive magnetic force, the centrifugal repulsion will occur laterally between the magnetic lines of force that are spreading outwards and away from each other in the region between the repelling objects. Magnetic repulsion is therefore identical in principle to the force which holds the planets up against gravity. It arises from centrifugal pressure in the electric sea. See 'Bernoulli's Principle and the Theory of Flight'.[2]

Electromagnetic Induction

III. The centrifugal force is also involved in electromagnetic induction. Maxwell introduced it again at equation (77) in the form $\mathbf{E} = \mathbf{v} \times \mathbf{B}$, where **E** refers to the electromotive force. Maxwell attempted to explain the convective aspect of electromagnetic induction in terms of a differential pressure in the vortices on either side of a wire that is moving through his vortex sea. He assumed that this pressure differential would result in different vorticities on opposite sides of the wire, with the resultant determining the direction of the current flow in the wire. See **Appendix A** for Maxwell's actual explanation.

In a wire that is moving through a magnetic field at right angles to that field, there will be a centrifugal barrier on the windward side of the motion due to the rotating electron-positron dipoles of the electric sea. The electron-positron wind will split into two streams. One stream will flow under the wire and the other stream will flow over the wire. This will cause a transverse stress which will induce more centrifugal aether pressure above and below the wire. On the leeward side of the motion, the electric sea will be rarefied and the tension in the aether will induce yet more aether pressure. Hence the induction of the aether pressure opposes the effect that causes it, and so work will need to be done in order to sustain the motion of the wire. This is known as Lenz's law. The pressure gradient around the wire will give rise to a vorticity gradient. The aether pressure constitutes positive electric charge, and the vorticity gradient will cause a discharge into the conducting material of the wire at right angles to the direction of the wire's motion. Hence electric current will be induced by a compound centrifugal force.

In a planetary orbit, a centrifugal barrier is encountered on the windward side of the planet's motion. As in the case of the electric wire, the electron-positron wind will split and flow around the planet hence generating more centrifugal aether pressure by transverse stress. And as in the case of the electric wire, the rarefaction on the leeward side will induce yet more aether pressure. But since we do not have a magnetic field pattern, there will be no right angle deflection of the transverse motion other than what might be due to an imbalance between centrifugal pressure and gravity in the radial direction. The compound centrifugal force in the transverse direction only manifests itself whenever a radial motion takes place as in the case on non-circular orbits. In that case, the compound centrifugal force will deflect the radial motion into the transverse direction. In the 19th century, the French scientist Gaspard-Gustave Coriolis identified this compound centrifugal force with the expression $2m\mathbf{v}\times\boldsymbol{\omega}$ and indeed he coined the name 'compound centrifugal force' for that purpose. The factor of 2 tells us that space is behaving like a rigid solid where vorticity $\mathbf{H}$ is equal to $2\boldsymbol{\omega}$. Space is the sea of rotating electron-positron dipoles which we know is a rigid solid that is aligned in a solenoidal double helix fashion [3], and which gives rise to the inverse cube law dipole field which lies at the root of centrifugal force. The compound centrifugal force should rightfully be called the Coriolis force, but unfortunately that name has come to be applied to an illusory transverse inertial effect that is observed in rotating reference frames.

Work Done

IV. Centrifugal force can be written in the form $\nabla(\mathbf{A}.\mathbf{v})$ where $\nabla\times\mathbf{A} = \mathbf{B}$. This means that centrifugal force has an associated potential energy $\mathbf{A}.\mathbf{v}$ and hence it can involve work being done. We can see this potential energy in the case of two repelling bar magnets. In the special case of Coriolis force it is often thought that no work is done. Mathematically speaking this is true, but the Coriolis force deflects a motion that has been induced in a context which involves work having been done. In the case of electromagnetic induction in a moving wire, if we choose to call the electromotive force $\mathbf{E} = \mathbf{v}\times\mathbf{B}$ a Coriolis force, the work done as per Lenz's law will lie in the induction of the aether pressure, and the Coriolis force will then deflect that induced aether at right angles along the wire. The work done will therefore reside in the term $\partial\mathbf{A}/\partial t$ as is the case with time varying electromagnetic induction, where $\mathbf{A}$ refers to the momentum of the induced aether. In a planetary orbit, the $\partial\mathbf{A}/\partial t$ term corresponds to the force which causes the angular acceleration in a non-circular orbit. In time varying electromagnetic induction, the $\partial\mathbf{A}/\partial t$ term refers to angular acceleration since $\nabla\times\mathbf{A} = \mathbf{B}$. From these relationships we can deduce Faraday's law and further deduce that electromagnetic radiation must be a propagation of angular acceleration through the sea of rotating electron-positron dipoles.

Appendix A

(Maxwell on Motion Induced Electromagnetic Induction)

This is a quote from page 344 in Part II of Maxwell's 1861 paper 'On Physical Lines of Force'[1] regarding his explanation for electromagnetic induction as is induced in a wire that is moving in a magnetic field;

"In front of the wire, that is, on its east side, it will be seen that as the wire approaches each portion of the medium, that portion is more and more compressed in the direction from east to west, and extended in the direction from north to south; and since the axes of the vortices lie in the north and south direction, their velocity will continually tend to increase by Prop. X., unless prevented or checked by electromotive forces acting on the circumference of each vortex.

We shall consider an electromotive force as positive when the vortices tend to move the interjacent particles upwards perpendicularly to the plane of the paper.

The vortices appear to revolve as the hands of a watch when we look at them from south to north; so that each vortex moves upwards on its west side and downwards on its east side. In front of the wire, therefore, where each vortex is striving to increase its velocity, the electromotive force must be greater on its west than on its east side. There will therefore be a continual increase of electromotive force from the remote east, where it is zero, to the front of the moving wire, where the upward force will be strongest.

Behind the wire a different action takes place. As the wire moves away from each successive portion of the medium, that portion is extended from east to west, and compressed from north to south, so as to tend to diminish the velocity of the vortices, and therefore to make the upward electromotive force greater on the east than on the west side of each vortex. The upward electromotive force will therefore increase continually from the remote west, where it is zero, to the back of the moving wire, where it is strongest.

It appears, therefore, that a vertical wire moving eastward will experience an electromotive force tending to produce in it an upward current." James Clerk-Maxwell 1861.

References

[1] Clerk-Maxwell, J., "On Physical Lines of Force", Philosophical Magazine, Volume 21, (1861). See the third and fourth terms on the right hand side of equation (5) on page 168 and also see pages 171/172.
http://vacuum-physics.com/Maxwell/maxwell_oplf.pdf

[2] Tombe, F.D., "Bernoulli's Principle and the Theory of Flight"
http://www.wbabin.net/science/tombe29.pdf

[3] Tombe, F.D., "The Double Helix Theory of the Magnetic Field"
http://www.wbabin.net/science/tombe.pdf