

The Cause of Coriolis Force

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24th December 2008, Cebu City, Philippines
(25th March 2009, Amendment)

Abstract. In general, the Coriolis force is the perpendicular deflection of a moving element that arises in connection with rotation. It can be a deflection from the radial direction into the tangential direction, or from the tangential direction into the axial direction. A deflection from the tangential direction into the radial direction is the centrifugal force. The most fundamental Coriolis force of all arises in the all pervading electron-positron sea in connection with the torque which causes the rotating electron-positron dipoles to align solenoidally, hence producing the magnetic field. An electron-positron dipole generates a net aether pressure when it is disturbed from its equilibrium alignment, either by being stretched, compressed, caused to precess, or being caused to spin faster. Lenz's law, which arises in both linear polarization and magnetization, tells us that work must be done to generate this aether pressure (positive charge). The induced positive charge which arises when an electron-positron dipole is disturbed from its equilibrium situation gives rise to an inverse cube law dipole field. This inverse cube law dipole field can be observed on the large scale as the repulsive centrifugal force that is induced by tangential motion relative to any electron-positron dipole in the electron-positron sea. This is the entire basis of Euclidean geometry.

In electromagnetic induction and electromagnetic radiation, the Coriolis force can arise as the right angle deflection of induced aether pressure, or the right angle deflection of electrons and positrons which then causes aether pressure to be induced. In larger scale phenomena such as gyroscopes and rattlebacks, the Coriolis force arises from a torque which is in turn rooted in centrifugal aether pressure.

Without the all pervading electron-positron sea, there can be neither centrifugal force nor Coriolis force. And without one or other of these two forces, we can explain neither light, nor magnetism, nor gyroscopes, nor rattlebacks, nor Kepler's laws of planetary motion.

Introduction

I. In section III of 'Gravitation and the Gyroscopic Force' at,

<http://www.wbabin.net/science/tombe5.pdf>

it was predicted hydrodynamically that four fundamental aethereal based forces could exist, and that the complete Lorentz force should take the form,

$$\mathbf{E} = \text{grad}\psi + \text{grad}(\mathbf{A}\cdot\mathbf{v}) - \mathbf{v}\times\mathbf{H} + \partial\mathbf{A}/\partial t(\text{angular acceleration}) \quad (1)$$

where $\text{grad}\psi$ is the aether inflow force (G1), $\text{grad}(\mathbf{A}\cdot\mathbf{v})$ is the centrifugal force (G2), $\mathbf{v}\times\mathbf{H}$ is the Coriolis force (G3), and $\partial\mathbf{A}/\partial t$ is the angular force (G4).

Ampère's Circuital Law

II. Ampère's Circuital Law is the equilibrium solenoidal alignment of vortices along their rotation axes. Maxwell showed at equation (9) in his 1861 paper 'On Physical Lines of Force' at,

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

that Ampère's Circuital Law is a Coriolis force equation, although he never explicitly used the term Coriolis force as that name hadn't come into general usage in his time. Maxwell's sea of molecular vortices will now be considered to be a sea of rotating electron-positron dipoles that are aligned solenoidally with their rotation axes tracing out magnetic lines of force. An electron is an aether sink and a positron is an aether source. The mechanism and driving force behind these sinks and sources is unknown.

The electron-positron sea will be held together in its stable equilibrium configuration by forces acting between the electrons and the positrons. However, any disturbance of this equilibrium configuration will ignite additional aether pressure on top of the already existing inter-particle forces. Work will need to be done to ignite this additional pressure and that is the basis of Lenz's law. Disturbing the electron-positron sea will have an effect that is more similar to the striking of a match than it is to the disturbing of a mechanical spring. A single rotating electron-positron dipole will be forced into the solenoidal magnetic field arrangement by a torque which arises from aether pressure. This torque causes a rotating electron-positron dipole to precess into line, and in doing so, it causes the motion of the electron and the positron to deflect from the tangential

direction into the axial direction. This is the most fundamental Coriolis force of all.

Ampère's Circuital Law and the Gyroscope

III. When a gyroscope spins, the all pervading electron-positron sea will flow through it, as like water flowing through a basket. Rotation therefore induces a kind of electric current inside a material body. This electric current acts like trolley wires which connect that body with the all pervading electron-positron matrix. The molecules of the gyroscope are tiny vortices on the nanoscopic scale and they will align in the electron-positron wind such as to present a totally symmetrical face to the wind, otherwise there will be a torque acting on the molecules and we would not therefore have an equilibrium. The spin axes of these tiny gyroscopic molecules will then trace out concentric circles around the spin axis of the large gyroscope itself. There will be a radial centrifugal pressure gradient relative to the gyroscope axis since the gyroscope molecules will be mutually aligned with their equatorial planes in the radial direction within the large gyroscope. The situation will be like a sea of tiny gyroscopes within a large gyroscope, with the equatorial planes of the tiny gyroscopes aligned like radial spokes on the axis of the large gyroscope, and perpendicular to the equatorial plane of the large gyroscope. As the large gyroscope spins faster, more centrifugal aether pressure will be generated from the tangential shear stress in the electron-positron wind as it blows between the tiny gyroscopic molecules in the role of a kind of electric current. See 'The Cause of Centrifugal Force' at,

<http://www.wbabin.net/science/tombe43.pdf>

If we now cause the gyroscope to precess, the electron-positron wind will change its angle of attack, and a new equilibrium alignment of the gyroscopic molecules will take place accordingly. These molecules will precess, and in doing so, the centrifugal pressure gradient will change its direction. The new direction will be such that the centrifugal force will push against the all pervading electron-positron sea, hence causing a torque on the large scale, and hence causing the gyroscope's own precession to be deflected by ninety degrees.

This centrifugal pressure in the electron-positron sea can prevent a pivoted spinning gyroscope from toppling over against the force of gravity. The electron-positron sea is an all pervading elastic solid which

acts like an arrester hook that prevents a pivoted spinning gyroscope from toppling over. However, since modern physics recognizes neither the centrifugal force, nor the Coriolis force, nor the electron-positron sea, this interesting aspect of a gyroscope's behaviour cannot possibly be explained satisfactorily in the textbooks. If we forcibly resist an induced Coriolis force and hence resist the deflection of the precession of a gyroscope, work will have to be done. This is Lenz's law. It means that tangential forces in the electron-positron sea will be generating more aether pressure.

The centrifugal pressure (centrifugal charge) in the large spinning gyroscope is an effect of the tangential interaction with the all pervading electron-positron sea. It will therefore have no direct effect in terms of centrifugal repulsion on a neighbouring large scale spinning gyroscope, other than that which would arise from any induced magnetic field.

The electron-positron wind itself should take on a solenoidal alignment such as to produce a magnetic field on the large scale around a large scale spinning object. This solenoidal alignment will be perpendicular to the solenoidal alignment of the molecules in the large scale spinning object. This spin-induced magnetism is an extremely weak effect, but it is clearly evident in the case of the planet Saturn. Magnetization by rotation was first detected by SJ Barnett in 1915. See 'Saturn Exhibits Spin-Induced Magnetism' at,

<http://www.wbabin.net/science/tombe33.pdf>

Electromagnetic Induction

IV. In electromagnetic induction, we are concerned with the aether pressure in the magnetized electron-positron sea. In the purely translational motion of a suitably shaped object, the electron-positron sea will be entrained by gravity with that object, right out to the shear region where its gravitational field meets the gravitational field of neighbouring objects. Aether pressure will occur on the windward side of the motion. Maxwell explained the convective aspect of electromagnetic induction using the principle that the wire causes a compression immediately in front of its path of motion. As the wire moves in the equatorial plane of the rotating electron-positron dipoles of the magnetic field, it will encounter a kind of centrifugal barrier. The compression of these electron-positron dipoles in front of the wire will result in an increase in

their circumferential speed. This disturbance will generate aether pressure, and input work will need to be done in line with Lenz's law.

A corresponding reduction in the circumferential speed of the electron-positron dipoles behind the wire will result in a pressure and vortex gradient around the wire, and hence the newly generated pressurized aether in front of the wire will be deflected at right angles along the wire by the dominant vortex aether flow in front of the wire. The $\mathbf{v} \times \mathbf{H}$ term of the Lorentz force refers to the fact that the induced aether pressure has been deflected by ninety degrees. This deflection is a Coriolis force. The Coriolis force in isolation involves no work done. But Lenz's law is involved in this situation and work is done against the resistance which ignites the aether pressure (positive charge). It is the newly generated aether pressure that is deflected tangentially. If we are dealing with a Coriolis force in isolation, the deflection would be on moving particles with velocity \mathbf{v} , and no work would be done because the Coriolis force in this situation represents a yielding to the centrifugal barrier which results in a sideways deflection.

In the time varying kind of electromagnetic induction, the $-\partial\mathbf{A}/\partial t$ force refers to the aether pressure which has been propagated through the electron-positron sea in the form of electromagnetic radiation, having been generated by a disturbance such as tangential force at its source. Electromagnetic radiation is a vortex flow of pressurized aether which discharges at right angles into a wire. When the electromagnetic radiation is in the equatorial plane of the solenoidal field, the aether pressure can be said to be centrifugal pressure. When the radiation is in the axial plane of the solenoidal field, the aether pressure in the precessional gyroscopic radiation cannot accurately be considered to be centrifugal in origin. It might be more accurately described as Coriolis in origin. The vector \mathbf{H} refers to the magnetic field strength. \mathbf{H} is the vorticity of the aether in the rotating electron-positron dipoles and it is related to the curl of \mathbf{A} . The vector \mathbf{A} is the aether field momentum which Maxwell identified with Faraday's *electrotonic state*. In both kinds of electromagnetic induction, Lenz's law is a consequence of the work that needs to be done in generating the aether pressure by disturbing the electron-positron dipoles.

Kepler's Laws of Planetary Motion

V. Kepler's laws of planetary motion are based on two effects working together in tandem. There is the Euclidean geometry of the electron-positron dipole field which gives rise to the inverse cube law centrifugal pressure field. There is also the fluid aether monopole field which permeates the electron-positron sea and which flows into large sinks and also into the electron sinks. This latter field is the inverse square law force of gravity which is caused by the tension in the aether as it is being pulled into the sinks. The gravitational field and the dipole field are physically unified by the all pervading aether. The dipole field is actually a rigid solid that is comprised of aether vortices aligned solenoidally so as to cause the magnetic field.

Kepler's second law is the law of constant areal velocity (equivalent to the conservation of angular momentum) and it is based on the fact that there is no net tangential force acting in two body planetary orbital motion. There are however two distinct tangential forces acting which do not cancel each other out physically and which can be individually observed, albeit that they are always equal and opposite in magnitude and direction. In a non-circular orbit, there is a G4 angular force acting which causes the tangential speed of a planet to increase or to decrease. There is also a force which has the mathematical form of the G3 Coriolis force, and which acts to constantly deflect the radial motion into the tangential direction.

Consider the special case of a planet that is undergoing a circular orbit. In the radial direction, the planet will experience an outward G2 centrifugal force, and this will be balanced by an inward G1 gravitational force. By analogy with the wire moving in the magnetic field, we might also expect there to be a pressure on the windward side of the planet's motion and a corresponding rarefaction in the electron-positron sea on the leeward side. These will be the two tangential forces described above. The G3 Coriolis force will actually be caused by aether pressure in the dipole field, whereas the G4 force will be due to a tangential component of gravity. The tangential component of gravity will arise due to an increase in aether inflow which has been permitted by the rarefaction of the electron-positron sea on the leeward side of the motion. Therefore contrary to official teaching, it would appear that gravity has a tangential component, and that some aether vorticity exists in connection with bodies that are undergoing tangential motion. In the applied maths textbooks, this fact is masked by eliminating the tangential equation from the analysis on the

grounds that the two tangential terms cancel mathematically. The fact that the two terms do not physically cancel is generally ignored.

Now consider an elliptical orbit. When the radius is decreasing, the planet's speed in the tangential direction will be increasing due to the tangential component of gravity. The induced aether pressure on the windward side of the planet's motion will be causing a Coriolis force which will have the effect of continually deflecting the direction of the radial motion. At the moment when the planet reaches its point of closest approach, the centrifugal pressure will change sides and push from the leeward side of the planet as it moves outwards, continuing to cause Coriolis force, but now in the opposite direction. Tangential gravity coming from the windward side will cause the speed in the tangential direction to decrease.

The aether pressure in the tangential direction causes a Coriolis force of the $2m\mathbf{v}\times\boldsymbol{\omega}$ kind. The fact that we have $2\boldsymbol{\omega}$ in the place of \mathbf{H} , where $\boldsymbol{\omega}$ is the angular velocity, means that the motion is the equivalent to the electron-positron sea rotating as one rigid solid.

The Cyclones

VI. Real Coriolis force is present in all vortex phenomena. The visible presence of real Coriolis force in the oceans and in the atmosphere follows from the conservation of angular momentum as in the case of Kepler's law of areal velocity. The radial motion in a vortex can clearly be observed to be getting deflected into the tangential direction. However, modern physics teaches that the Coriolis force in the cyclones and the ocean currents is caused by the Earth's rotation. The Earth's rotation does cause the cyclonic behaviour of these effects by setting the original direction of the angular momentum. But the Coriolis force itself is a real hydrodynamical effect which has got nothing to do with the Earth's rotation. North-south air currents will only co-rotate with the Earth's rotation if the co-rotating atmosphere can supply the necessary Coriolis force on these moving north-south air currents within it. This clearly doesn't happen and so these north-south air currents will deflect into the east-west direction relative to the surface of the Earth, due to their linear momentum. East-west air currents will cause a tightening up or a slackening of the centrifugal force within the co-rotating atmosphere, hence leading to a kind of Archimedes' principle which will cause a north-south deflection. These deflections will set the initial direction for

the angular momentum of a large cyclone. Conservation of angular momentum will then cause the real Coriolis force which can be observed from outer space. The rotational behaviour in cyclones cannot be caused by a fictitious effect as is taught in modern textbooks. Modern textbooks teach that Coriolis force is only a fictitious effect which is observed from rotating frames of reference, but that nevertheless it is the cause of the large scale cyclonic effects in the atmosphere which can be viewed from outer space.

The Rattleback

VII. The rattleback is the most mysterious of all the large scale mechanical devices. A spinning rattleback undergoes a complete 180 degree reversal of its angular momentum without any apparent source of reversal torque. The situation is further complicated by the fact that some rattlebacks can work in both directions. Modern physicists cannot explain the rattleback mystery because they deny all three of the vital ingredients that are necessary for its full understanding. We first need centrifugal charge followed by Coriolis force. We also need the electron-positron sea in order to induce these convective effects, and also to give the reversal torque something to kick off against, as per Newton's third law of motion. The rattleback is very obviously tangled up in a very subtle elastic medium, but this medium along with the centrifugal force and the Coriolis force, which are the basis of the interaction with this medium, are denied in modern physics.

Anybody watching a rattleback in action will observe that its initial rotation is first converted into an up and down rocking motion which then gives way to a rotation in the reverse direction. The first impression is that of a 180 degrees precession caused by the Coriolis force. It is easy enough to accept that the initial rotation will induce a centrifugal pressure field in the rattleback. But it is much more difficult to see why a Coriolis force should kick in and reverse the direction of rotation, even though it is patently obvious that this is what is happening.

The asymmetrical shape of the rattleback is of course crucial, but it still doesn't automatically explain why the Coriolis force should kick in. We might draw the conclusion that with the asymmetrical shape that it is not possible to achieve a stable solenoidal alignment of the molecules of the rattleback within a particular mode of rotation, and that precession of the molecules will continue until equilibrium has been achieved, which may be never. This precession will of course cause a large scale Coriolis force

to act on the rattleback as a whole. If there were no damping friction and a rattleback were to continue reversing indefinitely, we might then be witnessing a kind of semi-liquid effect in which the individual molecules within the solid material are free to engage in a mutually aligned precessional motion. It would be like a sea of tiny gyroscopes with fixed relative positions making up a solid, but with freedom to engage in synchronized precession giving rise to a semi-liquid nature. This semi-liquid harmonic motion would satisfy the law of conservation of energy since the Coriolis force does not involve work done. Linear and angular momentum would also be conserved because the Coriolis force will be pushing against the centrifugal barrier in the all pervading electron-positron sea.

With certain asymmetrical shapes, we can visibly see how the centrifugal pressure field will have a component that is pointing in such a direction as to appear to be resisting the rotatory motion. In these cases the rotation axes of the individual molecules of the asymmetric rattleback will no longer exactly trace out concentric circles around the rotation axis of the rattleback. The rotation axes of the molecules will be deflected from the tangential direction, and their equatorial planes will be tilted into the direction of motion, and asking to be resisted by the electron-positron wind. Ampère's Circuital Law will be skewed. The rotation axes of the molecules will of course still be aligned in the equatorial plane of the large scale spin of the rattleback. The centrifugal force that is acting in the equatorial plane of these molecules will cause a mutual pressure against the oncoming electron-positron wind. But since the situation is not being forced, Lenz's law will not apply and so we should expect some kind of tangential deflection to occur, based on the vortex to vortex interaction with the electron-positron wind. That deflection might be either up or down, and if the effect is equal on both limbs of the rattleback, we might even expect that effect to cancel. On the other hand, if the effect on each limb were to cancel, the equilibrium may be unstable, resulting in a rocking motion in conjunction with gravity.

This leads us to another interesting feature of the rattleback. In order for the rocking motion to be enabled, we need to have static friction for the purposes of rolling. Without static friction, the rattleback will slide, and the effect will be damped out. A rattleback does not work very well on a slippery surface such as ice or soap. The necessity of static friction has caused the erroneous belief amongst modern physicists that friction contributes towards the mysterious reversal torque. But everybody ought to know that friction couldn't possibly supply a pro-active effect. Sliding

friction is only a damping force that absorbs energy, and static friction only holds an object in a fixed position.

Conclusion

VIII. In modern physics, the Coriolis force has lost its original meaning. Rotating frames of reference have been introduced like a hall of mirrors to confuse the entire subject. Coriolis force is considered to be a fictitious effect which is only observed from rotating frames of reference. This means that it is being used to explain phenomena that are more correctly related to a lack of Coriolis force. When no tangential force is applied to a radial motion as viewed from a rotating frame of reference, a circular motion will be superimposed on top of the radial motion, or indeed on top of any motion. This apparent tangential superimposition is not Coriolis force, and it is not accurately described by the $2m\mathbf{v}\times\boldsymbol{\omega}$ Coriolis term. Yet it is this negative effect that modern physicists believe to be Coriolis force. The Coriolis force has been belittled by modern physicists into the realms of illusion, along with the centrifugal force. There is no recognition of real Coriolis force in modern physics, hence leaving electromagnetic induction, gyroscopes, and rattlebacks totally unexplained.

Anybody watching a rotating rattleback reversing can see that it is tangled up in an all pervading elastic medium that possesses fine-grained rotational nature. The behaviour is reminiscent of an elastic torque that causes a recoil. It should only have been a question of establishing what this medium is and how the rotating rattleback hooks onto it. With the centrifugal force and the Coriolis force relegated to the realms of illusion, and the electron-positron sea and the aether both relegated to history, it is likely that any attempts to explain this elastic recoil effect will belong to the realms of delusion. There are official existing explanations, often by very skilful mathematicians. But no matter how skilful these mathematicians may be, their explanations are somewhat reminiscent of the spectacle of a skilful archer pretending to shoot an arrow from a bow without a string. In the official literature on rattlebacks, we might see an equation of motion in which one of the terms is reserved for the reversal torque. The problem is that they don't know what is causing the reversal torque, and no amount of mathematical manipulations with the known forces such as friction, gravity, or air resistance is likely to reveal that cause, anymore than the skilful archer will be able to shoot the arrow with the stringless bow. The reversal torque term in the equation of motion sits there like an empty seat waiting to be occupied when the reversal torque

decides to reveal itself. But just as you can't swim without water, neither can you explain the rattleback or the gyroscope without involving the aether and the electron-positron sea. We need to physically identify the arrester hook.

In one very recent attempt at explaining the mystery of the rattleback [1], the Coriolis force is actually mentioned by name. But it is not explained how the Coriolis force can be real enough to cause a very real reversal torque, in view of the official position that the Coriolis force is only a fictitious force that is observed from rotating frames of reference.

References

[1] H.K. Moffatt and Tadashi Tokieda, "Celt reversals: a prototype of chiral dynamics", *Proceedings of the Royal Society of Edinburgh*, **138A**, 361-368, 2008.