

Straight Line Motion

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Abstract. The straight line inertial path will be examined from the perspective that it is caused by pressure equilibrium in a sea of tiny aethereal whirlpools that are pressing against each other with centrifugal force while striving to dilate. This is opposite to the traditional perspective whereby centrifugal force is considered to be a consequence of the tendency of a body to move in uniform straight line motion in the absence of any Newtonian forces.

The Centrifugal Field

I. Long ago mankind knew that space is rendered into tiny whirlpools that are pressing against each other with centrifugal force while striving to dilate [1], [2], [3]. Whirlpools have a rotation axis and so they exhibit cylindrical symmetry which makes it difficult for some people to imagine how they would bond together with their neighbours. It is proposed that in the absence of any radial force fields that the individual rotation axes of these tiny whirlpools form concentric rings around a moving object. The moving object's line of motion would be at right angles to the centrifugal pressure being exerted on it by the tiny whirlpools striving to dilate. When this centrifugal pressure field (inertial field) is symmetrical, the motion will constitute the straight line inertial path. When many objects are simultaneously in motion in this all pervading sea of tiny whirlpools, their superimposed centrifugal pressure fields are the reason why a centrifugal force exists between any two objects that share mutual transverse motion.

The inertial field is proposed to be the general principle that underlies both the inertial forces and the magnetic field surrounding an electric current [4]. It's a geometrical fact that a moving object has a centrifugal acceleration to every point in space that does not lie along its path of motion. This fact largely goes unnoticed, disguised in the straight line inertial path, but it manifests itself as a physical reality when the moving object is opposed by a centripetal force. A centripetal force creates an imbalance in the inertial field. See the full mathematical analysis at section **VI** in "*Pythagoras's Theorem and Special Relativity*" [5].

At very high speeds, the inertial field surrounding a moving object would be Doppler shifted backwards into the shape of a cone.

The Coriolis Field

II. The Coriolis field is a transitory aspect of the inertial pressure field. Its roots lie in the gyroscopic behaviour of the tiny whirlpools which align to form the inertial (centrifugal) field. This fundamental gyroscopic behaviour is the tendency of the whirlpools in the immediate vicinity of a moving object to realign so as that their rotation axes form solenoidal rings around the path of motion. This is the basis of Ampère's Circuital Law as explained by Maxwell in his 1861 paper "*On Physical Lines of Force*" (equation (9) in Part I) [4]. On the large scale however, centrifugal and Coriolis forces are dependent on the choice of origin, and a physical effect that is deemed to be a centrifugal force from one perspective could be deemed a Coriolis force from another perspective. The inertial forces are not absolute quantities in kinematics. We can illustrate an example of Coriolis force through a set-up like a freely rotating platform with a radial groove. If we roll a marble outwards along the radial groove, the tendency of the marble to move in its straight line inertial path will result in it pressing against one side of the groove wall causing the turntable to angularly decelerate, and vice-versa if we roll the marble towards the centre of the turntable.

As a rule, we talk about Coriolis force when a radial motion is transversely deflected in a rotating system. In the turntable example, it was only because of our choice of origin that we called the transverse inertial force a Coriolis force. The physical interaction between the marble and the wall of the groove was no different in principle than had we considered a marble rolling around a circular groove resulting in an outward centrifugal force pressing against the outer wall of the groove. However, when we extrapolate the Coriolis force to the elements of a pivoted precessing gyroscope, the very real anti-gravity effect is tied up with a tendency for the rotation axis to realign, similar in principle to that which occurs within the tiny whirlpools during the formation of the inertial field. The gyroscopic behaviour of the tiny whirlpools that leads to the inertial field in the first place is therefore replicating itself on the large scale within a laboratory gyroscope indicating a consistent pattern of behaviour across different scales [6].

The tiny whirlpools that fill all of space are in effect the prototype gyroscope. It would seem that the matrix of the universe is a compressed sea of tiny fluid gyroscopes. These naturally self-align along their mutual rotation axes forming solenoidal double helix magnetic or inertial lines of force [7], [8].

Conclusion

III. The inertial forces are real but they are not Newtonian forces. They are relative and not absolute since they are origin dependent. They arise as a consequence of Newton's first law of motion but they are not included among

the forces that are relevant for the purpose of this law. Since centrifugal force is most commonly encountered in the context of circular motion it is often hard for people to grasp the fact that it is primarily a product of motion and not of curvature. While they generally understand that curvature of the path of motion is caused by an inward acting centripetal force, they can find it hard to accept that the centrifugal force exists anyway due to the motion, independently of any curvature or any centripetal force. In cases where a centripetal force has been induced in a constraint by a moving object pushing or pulling against it, this leads to an action-reaction pair across the two bodies, but the inertial centrifugal force itself is never a reaction to a centripetal force as is often wrongly believed.

A concentric inertial pressure field surrounds all moving objects, and when the pressure is symmetrical, a straight line inertial path will result. The magnetic field around an electric current is a special case of the inertial field. The inertial field is comprised of tiny aethereal whirlpools which naturally align along their mutual rotation axes and trace out concentric rings around the path of motion. These tiny whirlpools press against each other with centrifugal force while striving to dilate and this pressure is the deeper physical cause that underlies all kinematics and electromagnetic phenomena. The sea of tiny whirlpools serves as the medium for the propagation of light.

References

[1] O'Neill, John J., *PRODIGAL GENIUS, Biography of Nikola Tesla*, Long Island, New York, 15th July 1944
<http://www.rastko.rs/istorija/tesla/oniell-tesla.html>

*“Long ago he (mankind) recognized that all perceptible matter comes from a primary substance, of a tenuity beyond conception and filling all space - the Akasha or luminiferous ether - which is acted upon by the life-giving Prana or creative force, calling into existence, in never ending cycles, all things and phenomena. **The primary substance, thrown into infinitesimal whirls of prodigious velocity, becomes gross matter; the force subsiding, the motion ceases and matter disappears, reverting to the primary substance**”.*

[2] Whittaker, E.T., *“A History of the Theories of Aether and Electricity”*, Chapter 4, pages 100-102, (1910)
*“All space, according to the younger Bernoulli, is permeated by a **fluid aether, containing an immense number of excessively small whirlpools**. The elasticity which the aether appears to possess, and in virtue of which it is able to transmit vibrations, is really due to the presence of these whirlpools; **for, owing to centrifugal force, each whirlpool is continually striving to dilate, and so presses against the neighbouring whirlpools.**”*

[3] Lodge, Sir Oliver, *“Ether (in physics)”*, Encyclopaedia Britannica, Fourteenth Edition, Volume 8, Pages 751-755, (1937)
<http://gsjournal.net/Science-Journals/Historical%20PapersMechanics%20/%20Electrodynamics/Download/4105>
*In relation to the speed of light, **“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”***

[4] Clerk-Maxwell, J., *“On Physical Lines of Force”*, Philosophical Magazine, Volume XXI, Part I, page 171, Equation (9), Fourth Series, London, (1861)
http://vacuum-physics.com/Maxwell/maxwell_oplf.pdf

[5] Tombe, F.D., ***“Pythagoras’s Theorem and Special Relativity”*** (2018)
<http://gsjournal.net/Science-Journals/Research%20Papers-Mathematical%20Physics/Download/7184>

[6] Tombe, F.D., ***“The Inertial Helicopter”*** (2017)
<http://gsjournal.net/Science-Journals/Research%20Papers-Gravity/Download/6856>

[7] Tombe, F.D., ***“Magnetic Repulsion and the Gyroscopic Force”*** (2014)
<http://gsjournal.net/Science-Journals/Research%20Papers-Mathematical%20Physics/Download/6220>

[8] Tombe, F.D., ***“The Double Helix and the Electron-Positron Aether”*** (2017)
<http://gsjournal.net/Science-Journals/Research%20Papers-Mechanics%20/%20Electrodynamics/Download/7057>