

## A Short Note on Centrifugal Force

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**Abstract.** Just because centrifugal force isn't a Newtonian force doesn't mean that it isn't a real force. While the prevailing point of view is, that a Newtonian force is a superior kind of force as compared with an inertial force, this perspective hinges entirely on the existence of the totally undefined concept known as an *inertial frame of reference*. So first, we need to establish the physical basis for an inertial frame of reference, and only then will we be better placed to decide whether or not the Newtonian forces are any more real than the inertial forces.

### Inertial Centrifugal Force

**I.** A Newtonian force acts so as to cause a body to deviate from its state of rest or from its uniform straight-line inertial path, relative to an inertial frame of reference. An inertial force, on the other hand, such as a centrifugal force, arises in conjunction with a body that is undergoing its uniform straight-line inertial path. Nevertheless, when a body is forced to co-rotate within a rotating system, the radial centrifugal force that is referenced to the centre of the system, is just as real as any Newtonian force, and we don't need to be observing from the perspective of the rotating frame in order to perceive the reality of it. The reality is evidenced by the physical effects encountered in the case of machines and devices such as the centrifuge machine and the centrifugal governor, and in the case of rotating space stations, we see how centrifugal force can simulate gravity and produce a very real feeling of weight. None of these inertial forces are illusional. Furthermore, in a planetary orbit, the centrifugal force is a radial force, every bit as real as the radial gravitational force that it is undermining.

### Inertial Frames of Reference

**II.** The perspective that a Newtonian force is superior to an inertial force, hinges on the existence of such a thing as an inertial frame of reference, of which no physical definition exists. However, the clue to establishing the physical basis for such an inertial frame of reference, lies in the fact that a body's natural tendency to undergo uniform straight-line motion, means that the body possesses not just one centrifugal force, but rather a centrifugal force to every point in space that is not situated along the line of motion. These centrifugal forces at all the points surrounding the moving body are actually plotting out a weak magnetic field, [1].

It's further relevant to note that an inertial centrifugal force can be transmitted by collision to another body, causing a Newtonian centrifugal force to act on the other body. One example of centrifugal force being transmitted to another body as a Newtonian force, is the centrifugal pressure that acts on the inside of the walls of Newton's rotating bucket of water. In this case, providing we select the centrifugal force that is measured to the centre of curvature of the water's path, then the centrifugal force and the centripetal force will form an equal and opposite action-reaction pair. This scenario is highly relevant to the way James Clerk Maxwell explained magnetic repulsion in terms of a sea of tiny aethereal vortices pressing against each other with centrifugal force while striving to dilate, [2], [3], [4], [5], [6], [7], [8].

More generally, when a centripetal force that arises from a constraint, acts on another body so as to cause curved path motion, it will form an equal and opposite action-reaction pair with the particular centrifugal force that is measured relative to the centre of curvature. This is where it is important to distinguish between a *centripetal force*, on the one hand, and a *central force*, on the other hand. A central force like gravity does not form an equal and opposite action-reaction pair with the centrifugal force in a planetary orbit.

## **Magnetic Deflection of a Charged Particle**

**III.** The formula  $\mathbf{F} = q\mathbf{v}\times\mathbf{B}$  represents the magnetic force that deflects a moving charged particle from its uniform straight-line inertial path. It could therefore be argued that the uniform straight-line inertial path is simply the special case where  $q$  and  $\mathbf{B}$  are negligible, or where the motion is parallel to the magnetic field. According to Maxwell's theory,  $\mathbf{F} = q\mathbf{v}\times\mathbf{B}$  is a centripetal force resulting from the difference between two centrifugal forces that are induced in the equatorial planes of the tiny aethereal vortices that fill all of space, [2].  $\mathbf{F} = q\mathbf{v}\times\mathbf{B}$  does not therefore form part of an equal and opposite action-reaction pair with either of the two opposing centrifugal forces, never mind that all these forces are acting on the same body. Any action-reaction pair in the context will have to involve the source of the magnetic field.

## **Conclusion**

**IV.** Every object in a state of motion induces a surrounding magnetic field, no matter how weak, and this field relates to the alignment of the tiny aethereal vortices that Maxwell suggested filled all of space, [2]. It is proposed that this medium forms the basis of an inertial frame of reference and that it does not rotate relative to the background stars. Motion through this dense sea of tiny vortices causes an effect in a likeness to the creation of smoke rings. The tiny vortices are induced to align into vortex rings which, due to centrifugal force in their equatorial planes as they strive to dilate, press inwards on the moving body

while their mutual rotation axes trace out solenoidal rings around it, in the likeness of magnetic field lines. Inertial centrifugal force therefore looks very much like the convective force,  $\mathbf{E} = \mathbf{v} \times \mathbf{B}$ , which forms around a charged body in motion, as is predicted by the Lorentz transformation of the electric field, [9], [10]. This magnetic force, however, is not to be confused with that other closely related magnetic force,  $\mathbf{F} = q\mathbf{v} \times \mathbf{B}$ , mentioned in section III above.

When two moving bodies are undergoing a fly-by of each other, what then happens depends upon whether or not they possess enough gravitational mass to entrain the surrounding sea of vortices within their gravitational fields. In a terrestrial situation, it is likely that they won't, and that their respective weak magnetic fields will not be bonded into them as they move through the vortex sea. As such, they will both likely continue along their uniform straight-line inertial paths undeflected. However, in the case of two planetary bodies in which gravity is entraining a significant region of the sea of vortices around each body, a magnetic field will form around the entrained regions, causing a magnetic/centrifugal force of repulsion to act at the interface between each gravitational region. Hence, in the domain of celestial mechanics, the concept of an inertial frame of reference doesn't possess the same significance that it does in terrestrial mechanics, [11]. In celestial mechanics we lose our basis for defining the uniform straight-line inertial path, leaving centrifugal force as a radial force just like gravity, very real, and acting in opposition to gravity, and it is totally irrelevant that gravity also happens to be a Newtonian force while centrifugal force isn't, [12].

## References

[1] Tombe, F.D., "*Straight Line Motion*", (2018)

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[2] Clerk-Maxwell, J., "*On Physical Lines of Force*", Philosophical Magazine, vol. XXI, Fourth Series, London, (1861)

[http://vacuum-physics.com/Maxwell/maxwell\\_oplf.pdf](http://vacuum-physics.com/Maxwell/maxwell_oplf.pdf)

[3] Whittaker, E.T., "*A History of the Theories of Aether and Electricity*", chapter 4, pp. 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."*

[4] O'Neill, John J., "*PRODIGAL GENIUS, Biography of Nikola Tesla*", Long Island, New York, 15th July 1944, Fourth Part, paragraph 23, quoting Tesla from his 1907 paper "*Man's Greatest Achievement*" which was published in 1930 in the Milwaukee Sentinel,

*"Long ago he (mankind) recognized that all perceptible matter comes from a primary*

*substance, of a tenuity beyond conception, filling all space, the Ākāśa 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.”*

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[6] Tombe, F.D., *“The Double Helix and the Electron-Positron Aether”*, (2017)

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[7] Lodge, Sir Oliver, *“Ether (in physics)”*, Encyclopaedia Britannica, Fourteenth Edition, vol. 8, pp. 751-755, (1937)

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See pp. 6-7 in the pdf file in the link above, beginning at the paragraph that starts with, *Possible Structure.* –, and note that while the quote suggests that the ether is incompressible, this is almost certainly not the case. The quote in question, in relation to the speed of light, reads,

*“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”*

[8] Tombe, F.D., *“The Importance of Centrifugal Force”*, (2022)

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[9] Tombe, F.D., *“The Lorentz Aether Theory”*, (2020)

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1<sup>st</sup> May 2025 amendment