# Inertia is Centrifugal Force

**Frederick David Tombe**
**Belfast, Northern Ireland, United Kingdom,**
**Formerly a Physics Teacher at**
**College of Technology Belfast, and**
**Royal Belfast Academical Institution**
**sirius184@hotmail.com**
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**Abstract. Inertia is generally understood to be that tendency of a body to continue in its state of uniform motion unless acted upon by an external force.**

**This is a very limited Cartesian way of looking at the situation. The general situation can be understood entirely within the context of centrifugal force.**

## Centrifugal Force

**I**. Centrifugal force is one of four aethereal based forces of which the other three are combined together into the Lorentz force. The Lorentz force was derived by Maxwell at equation (77) in his 1861 paper 'On Physical Lines of Force' [1] when Lorentz was still a young boy. Although Maxwell didn't include centrifugal force in equation (77) he nevertheless used the concept to account for the force of repulsion between Faraday's magnetic lines of force. In section **III** of 'Gravitation and the Gyroscopic Force' at,

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

it was shown how equation (58) in Maxwell's 1861 paper can be used to derive a form of the Lorentz force that includes centrifugal force. The term for centrifugal force is +grad(**A.v**) where **A** is aether field velocity. Since **A.v** is a scalar product of two vectors, it means that centrifugal force is a convective effect which occurs when a particle cuts across aether flow. More simply it can be considered as the mutually repulsive

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acceleration that occurs between any two particles as a result of their mutual tangential speed. It is the force that keeps the Moon from falling to the Earth.

## Planetary Orbital Theory and Inertia

**II**. If we have an ellipse whose coordinates are polar and focus based, and we differentiate it with respect to time, we obtain two distinct radial forces. We obtain an attractive inverse square law force and a repulsive centrifugal force working together in tandem.

The general solution for these two forces working together in tandem is a conic section. If the eccentricity is less than unity, we will have an ellipse. If the eccentricity is equal to unity we will have a parabola, and if the eccentricity is greater than unity we will have a hyperbola.

In the extreme case of the inverse square law vanishing, we will obtain a hyperbola of infinite eccentricity. This infinitely eccentric hyperbola is in fact the straight line motion that we witness in everyday Cartesian life and attribute to inertia.

Centrifugal force is all around us but we don't notice it because we generally don't pay any attention to the radial vector between objects. We tend to look at the relative motion of objects with respect to our local Cartesian coordinate frame.

This common observational omission has led to suggestions that centrifugal force does not exist since it can be written off as inertia.

Inertia is however a very archaic concept which is of no use to us when we are dealing with matters on the microscopic and astronomical scales where centrifugal force becomes manifestly very real.

## Rotating Frames of Reference

**III**. It is taught nowadays that centrifugal force is only a fictitious force that exists when we view a situation from a rotating frame of reference. If a weight is swung in circular motion on the end of a string and released, it will fly off both radially and tangentially. When asked which direction

the weight will fly off in, the educated person is expected to answer 'tangentially' and ignore the outward radial acceleration. Only the fool is expected to draw attention to the outward radial acceleration.

However, when we move into the centrifuge machine which masks the tangential motion that causes the radial acceleration, it then becomes legitimate to recognize the centrifugal force which brings about the desired physical centrifuge effect.

Centrifugal force is real, and unlike the Coriolis force it cannot be created as an artefact of a rotating reference frame since it is a radial effect. Coriolis force which can also be real, can however be created as a fictitious artefact of a rotating frame since it is a tangential effect. One famous example of fictitious Coriolis force is the Foucault pendulum. An example of real Coriolis force is the cyclones in the weather patterns which can be viewed from space.

# References

[1] Clerk-Maxwell, J., "On Physical Lines of Force", Philosophical Magazine, Volume 21, (1861)

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