The Net Attraction Force of the Gravitation Vortex

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This paper presents that an Inertial Mass Gravitation Vortex, is described by two Gravitational Attraction Forces, known as the Self Gravitational Field Force and the Newtonian Gravitational Field Force. These two attraction forces exist for every gravitational attraction and interaction between masses in an isolated and conserved inertial mass gravitational field vortex system. The Newtonian Gravitational Field Force is responsible for the specific individual gravitational attraction between an orbiting mass and the conserved inertial mass vortex system. The Self Gravitational Field Force is responsible for the total curvature and total gravitational attraction of the conserved inertial mass vortex system. This model predicts that the Newtonian Gravitational Field Force is a limiting force, when compared to the Self Gravitational Field Force, of the total gravitational attraction of a conserved inertial mass vortex system. Additionally this paper presents that the Kepler "Evolutionary Attraction Rate" of the gradient gravity field is not infinitely small but has a finite curvature described by the Schwarzschild radius of the gravity vortex.

1. Introduction

1.1. Newtonian & Self Attraction Force Concept

Sir Isaac Newton in his 1687 Principia – The Mathematical Principles of Natural Philosophy, introduced a Gravitational Force of Attraction Law. It will be shown in this paper that Newton's presentation of the Gravitational Force of Attraction only describes a specific quantity of gravitational attraction between a specific orbiting mass, and the total inertial mass of an isolated conserved system. What Newton omits to describe is the Self Gravitational Field Force, which is total force of attraction and is equal to the net sum of the individual Newton Gravitation Field Attraction Forces; and that which gives a value to the gravitational vortex.

According to Newton and Kepler, any conserved gravitating system, of orbiting mass constituents, such as the masses of the solar system; orbit one of the foci, center of mass, center of gravity, or barycenter of the system. For example, in the solar system, the sun rotates or orbit in the solar system, as well as the planets. Therefore the solar system can be described by a total inertial mass vortex system; where each mass has its own Newtonian Gravitation Field Attraction Force, relative to the total Self Gravitational Field Attraction Force of the vortex system.

1.2. Inertial Net Mass System

A Net Inertial Mass (m_{Net}), is an isolated conserved system equal to the net sum of the constituent masses of a closed system; as described in the equation below.

$$m_{\text{Net}} = \sum_{i=1}^{N} m_i = \left[m_1 + m_2 + m_3 + \cdots + m_N \right] \to \text{kg} \quad (1)$$

A Net Inertial Mass (m_{Net}), can be used to describe a closed container of gas particles, a solar system, an atomic or molecular system, or a gravity vortex system [1], as well as other conserved mass systems.

2. Newtonian Concepts of Gravity

The following quotes regarding Newtonian Gravity are quotes from Newton's 1687 Principia – The Mathematical Principles of Natural Philosophy.

2.1. Newton - Book 3 Proposition 6 Theorem 6: [2]

"All bodies gravitate toward each of the planets, and at any given distance from the center of any one planet the weight of any body whatever toward that planet is proportional to the quantity of matter which the body contains."

2.2. Newton - Book 3 Proposition 7 Theorem 7: [3]

"Gravity exists in all bodies universally and is proportional to the quantity of matter in each."

2.3. Newton - Book 3 Proposition 8 Theorem 8: [4]

"If two globes gravitate toward each other, and their matter is homogeneous on all sides in regions that are equally distant from their centers, then the weight of either globe toward the other will be inversely as the square of the distance between the centers."

2.4. Newton – Book 1 Proposition 60 Theorem 23: [5]

"If two bodies (S) and (P), attracting each other with force inversely proportional to the square of the distance, revolve about a common center of gravity, I say that the principle axis of the ellipse which one of the bodies (P) describes by this motion about the other body (S) will be to the principle axis of the ellipse which the same body (P) would be able to describe in the same periodic time about the other body (S) at rest as the sum of the masses of the two bodies (S+P) is to the first of two mean proportional's between this sum and the mass of the other body (S)."

2.5. Gravitational Evolutionary Attraction Vortex [6, 10]

The statements made by Newton, above modify Kepler's Third Law of Harmonies Motion, and describe the mechanism for gravitational attraction and rotation, as being proportional to the net sum of the masses of a vortex system, and multiplied by an individual orbiting test mass, of the attraction system.

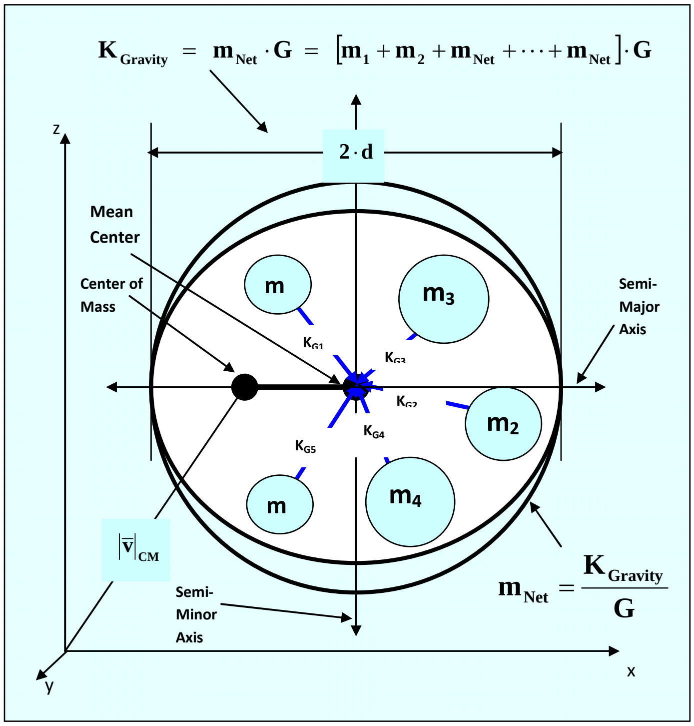

Fig. 1. Net Gravitational Evolution Sink Vortex Attraction Rate is dependent on the net mass of the system

Kepler's Third Law of Harmonies modified by Newton is termed the "Gravitational Evolutionary Attraction Rate" ($K_{Gravity}$), and is a measure of the total quantity of gradient gravitational field, vortex motion. The gravity vortex motion is a measure of the combined tangential rotation motion, and gravitational acceleration of attraction.

The "Evolutionary Attraction Rate" ($K_{Gravity}$), of the gravity vortex is directly proportional to the Net Inertial Mass (m_{Net}), and is a vector quantity which predicts that matter warps space and time, in its local vicinity; causing the space and time to change in proportion to ($T_{Period} = \bar{r}^{\frac{3}{2}} \cdot \sqrt{\frac{4\pi^2}{K_{Gravity}}}$) three halves the power of the distance, and directly with the period of rotation.

$$K_{Gravity} = m_{Net} \cdot G = 4\pi^2 \cdot \frac{\bar{r}_1^3}{T_{Period\,1}^2} = 4\pi^2 \cdot \frac{\bar{r}_2^3}{T_{Period\,2}^2} = \cdots = 4\pi^2 \cdot \frac{\bar{r}_i^3}{T_{Period\,i}^2} \quad (2)$$

The gradient of the gravitational field vortex system, is infinitely large, but cannot be infinitely small; and is therefore, finitely small or infinitesimal. Because of the net mass energy (m_{Net}) content of the system there is always curvature of space-time. Therefore, the smallest gradient, of the gravity field, and quantity of space of the gravity vortex is given by the Schwarzschild radius ($\bar{r}_{Schwarzschild} = 2 \cdot \left(\frac{m_{Net} \cdot G}{c_{Light}^2} \right)$) of the gravity vortex.

$$K_{Gravity} = m_{Net} \cdot G = 4\pi^2 \cdot \frac{\bar{r}_{Schwarzschild}^3}{T_{Schwarzschild}^2} = 4\pi^2 \cdot \frac{\bar{r}^3}{T_{Period}^2} \to m^3/s^2 \quad (3)$$

The "Evolutionary Attraction Rate" ($K_{Gravity}$), is equal for both the Newtonian and the Self Gravitational Attraction Force of the vortex system body [15, 16].

$$K_{Gravity} = m_{Net} \cdot G = \left(\frac{F_{Gravity}}{m_i} \right) \cdot \bar{r}^2 = \left(\frac{F_{Self\text{-}Gravity}}{m_{Net}} \right) \cdot \bar{r}^2 \quad (4)$$

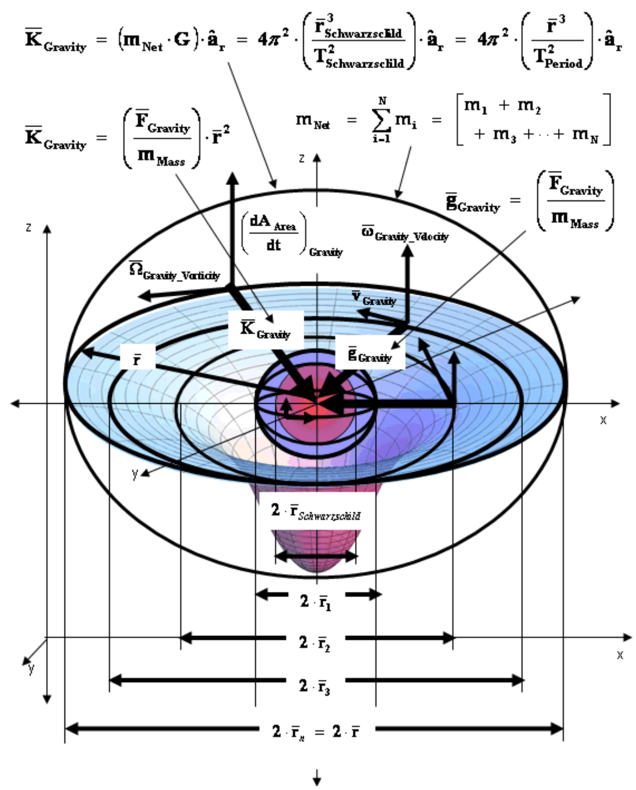

Fig. 2. The Gradient Gravitational Field of the Net Inertial Mass Vortex System body is comprised of a series of infinite gravity gradient energy potentials.

2.6. Two-Body Gravitational Evolutionary Attraction Vortex

For any two body gravitational vortex attraction system, the net sum of mass (P) and mass (S), will have the total "Evolutionary Attraction Rate" ($K_{Gravity}$), given by.

$$K_{Gravity} = [m_S + m_P] \cdot G \to m^3/s^2 \quad (5)$$

$$K_{Gravity} = 4\pi^2 \cdot \left(\frac{\bar{r}_S^3}{T_{Period\,S}^2} \right) = 4\pi^2 \cdot \left(\frac{\bar{r}_P^3}{T_{Period\,P}^2} \right)$$

The "strength" of Evolutionary Vortex Attraction ($\Upsilon_{Gravity\,P}$) of the mass of body (P) towards the mass of body (S), and towards the center of the vortex system is given by.

$$\Upsilon_{Gravity\,P} = m_P \cdot K_{Gravity} = m_P \cdot [m_S + m_P] \cdot G \to kg \cdot m^3/s^2 \quad (6)$$

$$\Upsilon_{Gravity\,P} = m_P \cdot K_{Gravity} = 4\pi^2 \cdot m_P \cdot \left(\frac{\bar{r}_S^3}{T_{Period\,S}^2} \right) = 4\pi^2 \cdot m_P \cdot \left(\frac{\bar{r}_P^3}{T_{Period\,P}^2} \right)$$

The "strength" of Evolutionary Vortex Attraction ($\Upsilon_{Gravity\,S}$) of the mass of body (S) towards the mass of body (P), and towards the center of the vortex system is given by.

$$\Upsilon_{Gravity\,S} = m_S \cdot K_{Gravity} = m_S \cdot [m_S + m_P] \cdot G \to kg \cdot m^3/s^2 \quad (7)$$

$$\Upsilon_{Gravity_S} = m_S \cdot K_{Gravity} = 4\pi^2 \cdot m_S \cdot \left(\frac{\bar{r}_S^3}{T_{Period\,S}^2} \right) = 4\pi^2 \cdot m_S \cdot \left(\frac{\bar{r}_P^3}{T_{Period\,P}^2} \right)$$

The "total strength" of Evolutionary Vortex Force of Attraction ($\Upsilon_{Self\_Gravity}$) of the net sum of the mass of body (S) and the mass of body (P), towards the center of the vortex system is given by.

$$\Upsilon_{Self\_Gravity} = m_{Net} \cdot K_{Gravity} = \left[\Upsilon_{Gravity_S} + \Upsilon_{Gravity\,P} \right] \rightarrow kg \cdot m^3 / s^2 \quad (8)$$

$$\Upsilon_{Self\_Gravity} = m_{Net}^2 \cdot G = \left[m_S + m_P \right]^2 \cdot G$$

$$\Upsilon_{Self\_Gravity} = 4\pi^2 \cdot m_{Net} \cdot \left(\frac{\bar{r}_S^3}{T_{Period\,S}^2} \right) = 4\pi^2 \cdot m_{Net} \cdot \left(\frac{\bar{r}_P^3}{T_{Period\,P}^2} \right).$$

2.7. Newtonian Gravitational Attraction Force [7, 11, 13]

The strength of the "Newtonian" Gravitational Force ($F_{Gravity}$) is a measure of the force of attraction and interaction of "mass towards mass", and varies in direct proportion to the product of the Net Inertial Mass (m_{Net}), multiplied by the orbiting "test" mass (m_{test}), and varies inversely with the square of the Semi-Major radius ($\frac{1}{r^2}$) distance, relative to the center of the Gradient Gravitational Field. [17]

$$F_{Gravity} = \frac{\Upsilon_{Gravity_i}}{r^2} = \frac{m_i \cdot K_{Gravity}}{r^2} \rightarrow kg \cdot m / s^2 \quad (9)$$

$$F_{Gravity} = \frac{m_i \cdot \left[m_1 + m_2 + m_3 + \cdots + m_N \right] \cdot G}{r^2}$$

$$F_{Gravity} = \left(\frac{m_i}{\bar{r}^2} \right) \cdot \left[4\pi^2 \cdot \frac{\bar{r}_1^3}{T_{Period\,1}^2} = 4\pi^2 \cdot \frac{\bar{r}_2^3}{T_{Period\,2}^2} = \cdot\cdot = 4\pi^2 \cdot \frac{\bar{r}_i^3}{T_{Period\,i}^2} \right]$$

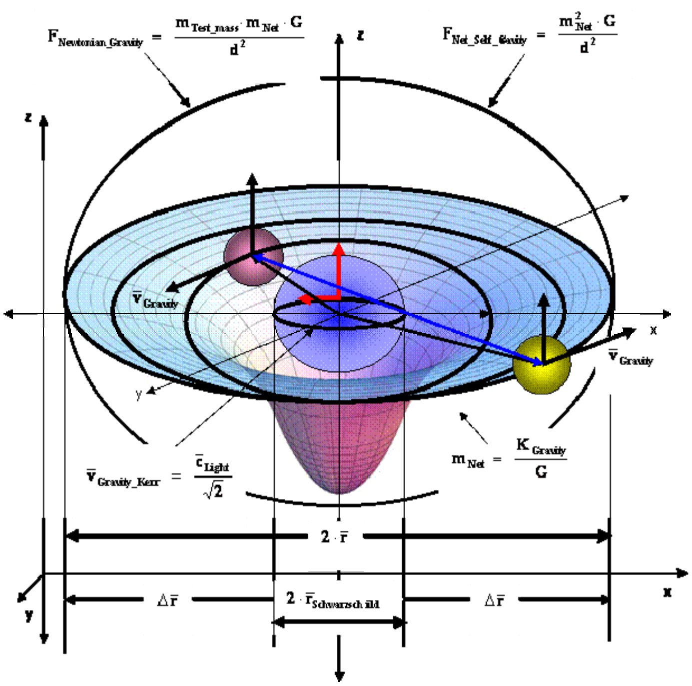

Fig. 3. An Inertial Mass creates a Self Gravitation and Newtonian Gravitation Attraction Vortex System.

The two body Newtonian Gravitational Force of Attraction ($F_{Gravity_P}$), of the mass of body (P) towards the mass of body (S), and towards the center of the vortex system is given by

$$F_{Gravity\,P} = \frac{m_P \cdot K_{Gravity}}{r^2} = \frac{m_P \cdot \left[m_S + m_P \right] \cdot G}{r^2} \rightarrow kg \cdot m / s^2 \quad (10)$$

$$F_{Gravity\,P} = \frac{m_P \cdot K_{Gravity}}{r^2} = 4\pi^2 \cdot \frac{m_P}{r^2} \cdot \left(\frac{\bar{r}_S^3}{T_{Period\,S}^2} \right) = 4\pi^2 \cdot \frac{m_P}{r^2} \cdot \left(\frac{\bar{r}_P^3}{T_{Period\,P}^2} \right)$$

The two body Newtonian Gravitational Force of Attraction ($F_{Gravity_S}$), of the mass of body (S) towards the mass of body (P), and towards the center of the vortex system is given by.

$$F_{Gravity_S} = \frac{m_S \cdot K_{Gravity}}{r^2} = \frac{m_S \cdot \left[m_S + m_P \right] \cdot G}{r^2} \rightarrow kg \cdot m / s^2 \quad (11)$$

$$F_{Gravity_S} = \frac{m_S \cdot K_{Gravity}}{r^2} = 4\pi^2 \cdot \frac{m_S}{r^2} \cdot \left(\frac{\bar{r}_S^3}{T_{Period\,S}^2} \right) = 4\pi^2 \cdot \frac{m_S}{r^2} \cdot \left(\frac{\bar{r}_P^3}{T_{Period\,P}^2} \right)$$

3. Self Gravitational Field Vortex System

3.1. Self Gravitational Force [8, 12, 14]

The strength of the "Self" Gravitational Force ($F_{Self\text{-}Gravity}$) is a measure of the force of attraction and interaction of "mass towards mass", and varies directly with the square of the Linear Mass Density ($\mu_{L\_Density}^2 = \frac{m_{Net}^2}{r^2}$); and likewise varies in direct proportion to the square of the Net Inertial Mass (m_{Net}^2), and varies inversely with the square of the Semi-Major radius ($\frac{1}{r^2}$), distance, relative to the center of the Gradient Gravitational Field.

The strength of "Self" Gravitational Force ($F_{Self\text{-}Gravity}$) is a measure of the attracting power of the total mass of gravity vortex towards the center of the gravity vortex system [17].

$$F_{Self\text{-}Gravity} = \frac{\Upsilon_{Self\_Gravity}}{r^2} = \frac{m_{Net} \cdot K_{Gravity}}{r^2} \rightarrow kg \cdot m / s^2 \quad (12)$$

$$F_{Self\text{-}Gravity} = \frac{m_{Net} \cdot K_{Gravity}}{r^2} = \frac{m_{Net}^2 \cdot G}{r^2} = \mu_{L\_Density}^2 \cdot G$$

$$F_{Self\text{-}Gravity} = \frac{m_{Net}^2 \cdot G}{r^2} = \frac{\left[m_1 + m_2 + m_3 + \cdots + m_N \right]^2 \cdot G}{r^2}$$

$$F_{Self\text{-}Gravity} = \left(\frac{m_{Net}}{\bar{r}^2} \right) \left[4\pi^2 \frac{\bar{r}_{Schwarzschild}^3}{T_{Schwarzschild}^2} = 4\pi^2 \frac{\bar{r}_2^3}{T_{Period2}^2} = \cdots = 4\pi^2 \frac{\bar{r}_i^3}{T_{Periodi}^2} \right]$$

The Self Gravitational Force of Attraction ($F_{Self\text{-}Gravity}$), is equal to the net sum of the individual Newtonian Gravitational forces of the net mass of the gravitational vortex system.

$$F_{Self\text{-}Gravity} = \sum_{i=1}^{N} F_{Gravity_i} = \frac{\Upsilon_{Self\text{-}Gravity}}{r^2} = \frac{1}{r^2} \cdot \sum_{i=1}^{N} \Upsilon_{Gravity_i} \quad (13)$$

$$F_{Self\text{-}Gravity} = \frac{K_{Gravity}}{r^2} \cdot \left(\sum_{i=1}^{N} m_i \right) = \frac{G}{r^2} \cdot \left(\sum_{i=1}^{N} m_i \right)^2$$

$$F_{\text{Self-Gravity}} = \left[F_{\text{Gravity}_1} + F_{\text{Gravity}_2} + F_{\text{Gravity}_3} + \cdots + F_{\text{Gravity}_N}\right]$$

$$F_{\text{Self-Gravity}} = \frac{m_{\text{Net}}^2 \cdot G}{r^2} = \frac{\left[m_1 + m_2 + m_3 + \cdots + m_N\right]^2 \cdot G}{r^2}$$

The two body Self Gravitational Force of Attraction ($F_{\text{Self-Gravity}}$), of the mass of body (S) and the mass of body (P) towards the center of the vortex system is given by the following.

$$F_{\text{Self-Gravity}} = \frac{m_{\text{Net}} \cdot K_{\text{Gravity}}}{r^2} = \frac{\left[m_S + m_P\right]^2 \cdot G}{r^2} \to kg \cdot m / s^2 \quad (14)$$

$$F_{\text{Self-Gravity}} = \frac{\left[m_S + m_P\right]}{r^2} \cdot \left[4\pi^2 \cdot \left(\frac{\bar{r}_S^3}{T_{\text{PeriodS}}^2}\right) = 4\pi^2 \cdot \left(\frac{\bar{r}_P^3}{T_{\text{PeriodP}}^2}\right)\right]$$

4. Conclusion

In concluding, this research models a gradient gravitational field as a vortex system in a novel way. The "Gravitational Vortex Theory" was described, where the isolated Net Inertial Mass (m_{Net}), is a conserved gravitational attracting vortex system; from which derives the Newtonian Gravitational Attraction Force, and the Self Gravitational Attraction Force.

It was shown that the Newtonian Gravitation Attracting Force (F_{Gravity}), is a measure of the strength of individual specific forces of attraction and interaction of individual mass towards mass. In contrast to the Self Gravitational Attracting Force; where the strength of "Self" Gravitational Force ($F_{\text{Self-Gravity}}$) is a measure of the total attracting strength of the total mass, of gravity vortex towards the center of the vortex system.

It was shown that Kepler's Third Law is a quantity termed the "Evolutionary Attraction Rate" (K_{Gravity}), which described attraction and rotation combined in a single term which is directly proportional the Net Inertial Mass (m_{Net}), of the gradient gravitational field system.

Finally it was described that the Kepler "Evolutionary Attraction Rate" ($K_{\text{Gravity}} = m_{\text{Net}} \cdot G = 4\pi^2 \cdot \frac{\bar{r}_{\text{Schwarzschild}}^3}{T_{\text{Schwarzschild}}^2}$), of the gradient gravity field is not infinitely small but has a finite curvature described by the Schwarzschild radius ($\bar{r}_{\text{Schwarzschild}} = 2 \cdot \left(\frac{m_{\text{Net}} \cdot G}{c_{\text{Light}}^2}\right)$) of the gravity vortex.

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Figures

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