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Constant Gravitational Mass of Moving Object and Variational Gravitational Field Deducing that Application Scope of General Theory of Relativity is Limited

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I. Introduction

In Applied Physics Research (Vo1.5, No.1) "Set up Invariable Axiom of Force Equilibrium and Solve Problems about Transformation of Force and Gravitational Mass" indicated that the gravitational mass of object is a constant unrelated to kinematic velocity of object. Since the gravitational field intensity is immediately related to gravitational mass, given the constant gravitational mass, is gravitational field constant too? If it is inconstant, what is the relationship between distribution of gravitation field and kinematic velocity of object? It is necessary for us to understand the relationship so as to accurately determine the force deserved and motion trace of object moving in high speed. Besides, constant gravitational mass and inconstant inertia mass, and whether equivalency principle and general theory of relative is true needs to be re-determined.

II. Distribution of Gravitational Field is Associated with the Motion of Object

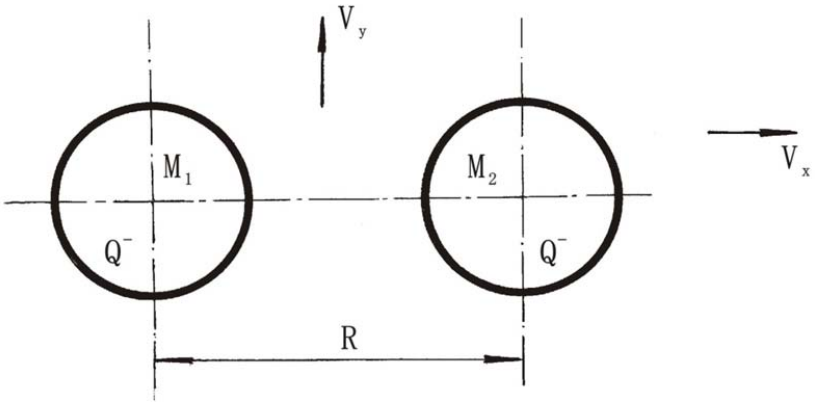

Figure 1 : Universal gravitation is equivalent to electrostatic repulsion

In Figure.1, objects on the left and right sides are identical in size and the center distance between two objects is R. Their gravitational mass is M_1 and M_2, and $M_1=M_2$(M_1 and M_2 are used for the convenience of explanation). These two objects carry negative charge Q^- with equivalent electric quantity. If the universal gravitation and electrostatic repulsion between the two objects are identical to each other to the moment, then the two objects are in balance state, with center distance R unchanged.

According to the special theory of relativity, experiments have proved that inertia mass is on the increase with the increase of kinematic velocity of object. If gravitational mass is equal to inertial mass, then the motion observer considers that the two objects are in motion and that M_1 and M_2 as gravitational mass

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of the two objects are on the increase and that universal gravitation is certain to increase. However, experiments have proved that electric quantity on object Q^- is unrelated to the motion of object and is constant. As a result, electrostatic repulsion is not on the increase, in this way, when the two objects are in motion, it is inevitable that universal gravitation is greater than electrostatic repulsion and that the two objects shall strike against each other. It is obvious that there is no such phenomenon, which is indicated in axiom of constant force balance that any motion observers are unable to change the balance state of force.

It can be known from the above mentioned explanation that if the balance state of the two objects does not change with the change of observer, it is inevitable that the gravitational mass of object is in no way to change with the motion of object like inertia mass does in this respect, therefore, gravitational mass shall be identical to electric quantity, being a constant unrelated to motion.

For the convenience of analysis and explanation, A is defined as gravitational field intensity, for M_2 (take M_2 as a point for analysis), on which the gravitational field intensity generated by M_1: $A_1 = GM_1/R^2$ (G-gravitation constant) as well as $A_2 = GM_2/R^2$, universal gravitation of M_1 and M_2: $F = A_1M_2 = A_2M_1$.

Given that the transformation formula for forces of various inertial systems is deduced according to force equilibrium axiom:

$$F' = F\sqrt{\frac{1-V^2\cos^2\theta/C^2}{1-V^2/C^2}} \qquad (1)$$

Where, C indicates the force exerting on the object at rest; F' refers to the force exerting on the moving object at the speed of V; θ refers to included angle between F and V; included angle between F' and V:

$$\theta' = c\,os^{-1}\cos\theta\sqrt{1-V^2/C^2}\Big/\sqrt{1-V^2\cos^2\theta/C^2}$$

It is known from Figure 1 that when two objects move at the speed of V_x, there is $F' = F$ according to transformation formula (1) of force. According to special theory of relativity, when two objects move at the speed of V_x, R shall be shortened to $R' = R\sqrt{1-V_x^2/C^2}$. For example, the gravitational field of M_1 is in uniform distribution, M_1 is constant, there shall be:

$$A_1' = GM_1/R_1'^2 = GM_1/R^2\left(1-V_x^{\,2}/C^2\right)$$

$$F' = A_1'M_2 = GM_1M_2/R^2\left(1-V_x^{\,2}/C^2\right) = F/\left(1-V_x^{\,2}/C^2\right) \neq F$$

Since formula (1) is from force equilibrium constant axiom, therefore, $F' = F$ is correct and $F' \neq F$ is false. We have determined that M_1 and M_2 are constant, the mistake shall be as a result of $A_1' = GM_1/R_1'^2$, namely the actual $A_1' \neq GM_1/R_1'^2$, indicating that when two objects are in motion, it is impossible for the gravitational field of M_1 (or M_2) to be in uniform distribution.

Similarly, when two objects move at the speed of V_y, $\theta = 90°$ and $\cos\theta = 0$. According to formula (1), there is $F' = F/\sqrt{1-V_x^2/C^2}$; however, the analysis of uniform distribution of gravitational field shows that there is $R \perp V_y$, and that R remains unchanged, namely $R' = R$, then there is $F' = F \neq F/\sqrt{1-V_y^2/C^2}$, thus it is obvious that this is a wrong inference too and indicates that uniform distribution of gravitational field is not in accordance with force equilibrium constant axiom and that distribution of gravitational field shall be subject to change with the motion of object.

III. Distribution of Gravitational Field of Moving Object

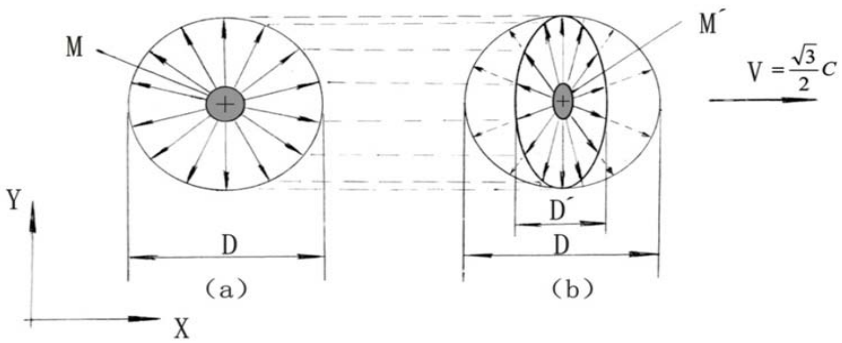

Figure 2 : When pellet M moves at the speed of V, the pellet shall contract along direction of V, and the gravitational line shall disperse along direction of V and concentrate along direction of V

In Figure 2 (a), pellet M generates uniform gravitational line in the surrounding, showing the circular cross section of space with a diameter of D through centre of pellet and the cross section shows that gravitational line is in uniform distribution; Figure 2 (b) shows that M moves at the speed of $V=\sqrt{3}C/2$. According to special theory of relativity, the diameter of M along direction of V shall reduce to $\sqrt{1-V^2/C^2}=1/2$ of original diameter, being M'. The diameter D of cross section of original space of M shall reduce to $D'=D/2$, since direction Y is normal to V, the diameter length of M along direction Y remains unchanged. It is obvious from Figure 2 (b) that the gravitational line of M' along vertical direction V becomes dense and along parallel direction V becomes sparse, and that the circle with a diameter D given in Figure (b) shows the pattern of gravitation line of cross section circle of the space M' in motion, based on which it is more obvious that gravitational line is changed from dense to sparse.

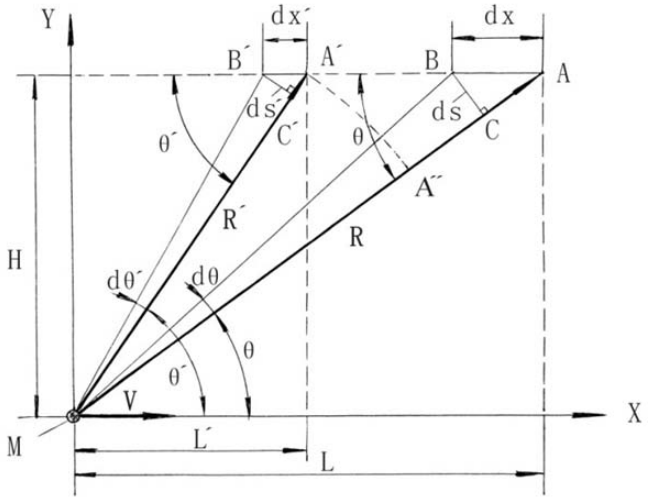

Figure 3 : The change of position of gravitational line when matter of point M moves at the speed of V

We take change of gravitational field in case of matter of point M in motion as an example. In Figure.3, M moves at the speed of V along direction X. According to special theory of relativity, the length along direction X shall contract according to ratio of $\sqrt{1-V^2/C^2}$.

Where L shall contract to $L'=L\sqrt{1-V^2/C^2}$; AB shall contract to $AB'=AB\sqrt{1-V^2/C^2}$. For the convenience of explanation, the AB and $A'B'$ are expressed by dx and dx', BC and $B'C'$ are expressed by ds and ds'. It is known that $BC\perp MA$ and $B'C'\perp MA'$ from triangle BMC and $B'MC'$.

$$ds=MB\sin d\theta;\ ds'=MB'\sin d\theta'$$

Since $d\theta$ and $d\theta'$ are infinitely small quantity, accordingly there is $\sin d\theta=d\theta$; $\sin d\theta'=d\theta'$ and $MB=MA=R$; $MB'=MA'=R'$. Thus, the above mentioned two formulas can be written as $ds=Rd\theta$ and $ds'=R'd\theta'$, herewith

$$\frac{d\theta}{d\theta'}=\frac{dsR'}{ds'R} \qquad (2)$$

It is known from right triangle ΔABC and $\Delta A'B'C'$ that:

$$ds=dx\sin d\theta=\frac{dx'\sin\theta}{\sqrt{1-V^2/C^2}}$$

$$ds'=dx'\sin\theta'$$

Substitute ds and ds' into formula (2) to obtain:

$$\frac{d\theta}{d\theta'}=\frac{dx'\sin\theta'R'}{dx'\sin\theta'R\sqrt{1-V^2/C^2}}=\frac{\sin\theta'R'}{\sin\theta'R\sqrt{1-V^2/C^2}} \qquad (3)$$

It is known from Figure 3 that

$$\sin\theta=\frac{H}{\sqrt{L^2+H^2}}=\frac{H}{\sqrt{H^2+L'^2/\left(1-V^2/C^2\right)}}=H\sqrt{\frac{\left(1-V^2/C^2\right)}{L'^2+H^2-V^2H^2/C^2}}$$

$$\sin\theta'=\frac{H}{\sqrt{L'^2+H^2}}$$

$$R=\sqrt{L^2+H^2}=\sqrt{\frac{L'^2+H^2-V^2H^2/C^2}{1-V^2/C^2}}$$

$$R'=\sqrt{L'^2+H^2}$$

Substitute the above four formulas $\sin\theta$, $\sin\theta'$, R and R' into formula (3), there is

$$\frac{d\theta}{d\theta'}=\frac{\sqrt{1-V^2/C^2}\cdot H\sqrt{L'^2+H^2}\sqrt{L'^2+H^2}\cdot\sqrt{1-V^2/C^2}}{\sqrt{1-V^2/C^2}\sqrt{L'^2+H^2-V^2H^2/C^2}\cdot H\sqrt{L'^2+H^2-V^2H^2/C^2}}=\frac{\left(L'^2+H^2\right)\sqrt{1-V^2/C^2}}{L'^2+H^2-\dfrac{V^2H^2}{C^2}}$$

$$= \frac{\sqrt{1-V^2/C^2}}{1-\frac{H^2}{L'^2+H^2}V^2/C^2} = \frac{\sqrt{1-V^2/C^2}}{1-\sin^2\theta' V^2/C^2} \quad (4)$$

Circumferential angle as a result of MA rotating around MX

$$\beta = \frac{2\pi H}{R} = \frac{2\pi H}{\sqrt{L^2+H^2}} = \frac{2\pi H}{\sqrt{H^2+\frac{L'^2}{(1-V^2/C^2)}}} = \frac{2\pi H\sqrt{1-V^2/C^2}}{L'^2+H^2-V^2H^2/C^2}$$

Circumferential angle as a result of MA' rotating around MX

$$\beta = \frac{2\pi H}{R'} = \frac{2\pi H}{\sqrt{L'^2+H^2}}$$

Solid angle as a result of ΔAMB rotating around MX

$$d\Omega = \beta d\theta = \frac{2\pi H}{R'} = \frac{2\pi H\sqrt{1-V^2/C^2}}{L'^2+H^2-V^2H^2/C^2}d\theta \quad (5)$$

Solid angle as a result of $\Delta A'M'B'$ rotating around MX

$$d\Omega' = \beta' d\theta' = \frac{2\pi H}{\sqrt{L'^2+H^2}}d\theta \quad (6)$$

By following the concept of electric flux of electric field, we introduce the gravitational flux concept for gravitational field. It is defined that the product of gravitational field intensity and the area (area of vertical gravitational line) through which the gravitational field goes as gravitational flux. It is obvious that gravitational field intensity is proportional to gravitational flux per unit area. If gravitational flux remains unchanged, the gravitational field intensity shall be inversely proportional to area through which gravitational flux goes. When gravitation source is matter of point, as shown in Figure 3, under the condition of same radius and gravitational flux, points A' and A'' in figure (their radius is r'), then gravitational field intensity shall be inversely proportional to solid angle occupied by the area in these two places (corresponding to $d\theta'$ and $d\theta$ respectively). (the gravitational fluxes in two points are same). Supposing that the gravitational field intensity at point A' is A' and that the gravitational field intensity at point A'' is $A°$, (point A'' refers to a point on MA when M remains still), obviously $A° = GM/(MA'')^2 = GM/r'^2$. The solid angle at point A'' is $d\Omega$ (when M remains still), the $d\Omega$ shall reduce to $d\Omega'$ at point A'. Gravitational field intensity shall be inversely proportional to solid angle occupied by unit area, namely:

$$\frac{A}{A'} = \frac{d\Omega}{d\Omega'}$$

Substitute (4),(5) and(6) into the above formula

$$\frac{A}{A°} = \frac{\sqrt{1-V^2/C^2}}{\sqrt{1-(H^2/L'^2+H^2)V^2/C^2}}\cdot\frac{d\theta}{d\theta'} = \frac{\sqrt{1-V^2/C^2}}{\sqrt{1-\sin^2\theta' V^2/C^2}}\cdot\frac{\sqrt{1-V^2/C^2}}{1-\sin^2\theta' V^2/C^2}$$

$$= \frac{1-V^2/C^2}{(1-\sin^2\theta' V^2/C^2)^{3/2}}$$

Namely,

$$A' = \frac{1-V^2/C^2}{(1-\sin^2\theta' V^2/C^2)^{3/2}}A° = G\frac{1-V^2/C^2}{(1-\sin^2\theta' V^2/C^2)^{3/2}}\cdot\frac{M}{r'^2} \quad (7)$$

Formula (7) is relational expression between distribution of gravitational field intensity and speed V and θ'. It can be known from the formula that when θ is smaller, there is $A' < GM/r'^2$ and the gravitation field weakens along direction X and that when θ' is greater, there is $A' > GM/r'^2$ and the gravitation field intensifies along direction Y. This is identical to the distribution of gravitational field shown in Figure 2 (b). It is obvious that when V is determined, there shall be a dividing angle $\theta°$, at the angle of $\theta°$, the gravitational field intensity remains unchanged. It is known from calculation that when $V < 0.6C$, there is $\theta° = 57.4°$, namely when the motion velocity of object is slower than 0.6 light velocity, the dividing angle shall be constant of 57.4°. The gravitational field intensity shall increase in case of more than 57.4°and the gravitational field intensity shall decrease in case of less than 57.4°, but when $V > 0.6C$, $\theta°$ shall show significant change. For example, when $V = 0.8C$, there is $\theta° = 61.45°$ and when $V = 0.99C$, there is $\theta° = 76.47°$.

It is known from comparison that formula (7) and field distribution formula for charged particle in motion are absolutely similar, therefore, with reference to the electric flux of charged body, there shall be, for gravitational field of moving object, in addition, there

shall be constant gravitational flux on any closure face enclosing the object

IV. Gravitational Field for Object in Relative Motion

For object (or other object) in motion relative to earth, when gravitational mass is the object of M falling toward earth at the speed of V, (V and R are parallel, supposing it is in the direction X), according to formula (7), there is $\theta' = 0$, $A'_x = G\left(1 - V^2/C^2\right)M/R'^2$. In our view that the object weakens in terms of transearth gravitational field, however, for the object, its length along direction of motion shall be shortened, there shall be $R' = R\sqrt{1 - V^2/C^2}$, after substituting it into formula A'_x, then there is $A'_x = GM/R^2$. This indicates that the universal gravitation of earth to the object at any moment shall be constantly equal to the universal gravitation of earth to the object in zero motion regardless of falling speed, just as what defined in transformation formula of force, in case of $\theta' = 0$, there shall be $F' = F$

When object with gravitational mass of M moves in parallel to earth surface at the speed of V, according to formula (7), there shall be $\theta' = 90°$ $A'_y = GM/R'^2\sqrt{1 - V^2/C^2}$ (when $V \perp R$, there is $R' = R$). In our view that that transearth gravitation of the object is increased, namely universal gravitation is on the increase.

V. Conclusion

The above analysis shows that the motion of object and the motion of charged body are absolutely similar when object is moving. Not only the gravitational mass of object similar to quantity of electricity of charged body is a constant, but also the distribution of gravitational field of object is similar to electric field of quantity of electricity and its gravitation is associated with direction. The inertial mass however is on the contrary. Its size is not only related to motion velocity but also has nothing to do with direction. Inertia mass is not a constant, indicating that gravitational mass and inertial mass are two different physical quantities, thus, there is no comparability between the two physical quantities, just like that there is no comparability between inertial mass and electric quantity of object. Therefore, it is concluded that gravitational mass is not possible to be equal to inertia mass, that is equivalency principle is impossible to be true.

It is well known that equivalency is the basis of general theory of relativity. Since equivalency is not tenable, general theory of relativity is accordingly not true.

Some people may question that why general theory of relativity can accurately calculate the precessional motion of mercury's perihelion and be used in GPS. It should be pointed out that verification results cannot prove that the theory is true, for example, geocentric theory that thinks the earth is the center of the universe is not true, but vernal equinox, autumnal equinox, the summer solstice and the winter solstice can be accurately calculated according to this theory. In this case, we cannot accordingly think that geocentric theory is true.

Since general theory of relativity is not true, why does it can be used some practices such as GPS? The author thinks that kinematic velocity of satellite, earth and mercury is very low in comparison with velocity of light and their inertia mass varies little, it is thus considered that their inertia mass is approximatively equal to rest mass, that is to say, inertia mass can be considered the constant like gravitational mass, then equivalency principle is true. Although inertia mass and gravitational mass are two different physical quantities, but if the both are directly proportional, it is assumed that the both are equal and there is no calculative errors on quantity. For example, the pressure of water vessel's bottom unit area is directly proportional to the height from water surface to the bottom. Assuming that pressure equals height, use height to replace pressure, the calculation result has no errors. For satellite and earth moving in low speed, since equivalency principle is true, then general theory of relativity is naturally true too. But for object moving in high speed, its inertia mass is obviously bigger than rest mass, thus inertia mass cannot be considered a constant and equivalency principle is not tenable, accordingly, the analytical result of general theory of relativity is naturally false.

The author thinks that the most obvious analytical error of general theory of relativity is that black hole does not exist at all, because black hole theory points out that the mass of a football court-sized black hole is five times the mass of the sun and 1.3 million times the mass of the earth. The size of the earth is 10^{15} times that of black hole (calculated by a round sphere with its diameter of 120m), that is the density of substances in black hole is more than 10^{21} times that of substances on the earth, which means that the total mass of trillion people on the earth is smaller than that of a grain of rice in black hole. It is known that all substances are composed of several elements among 118 kinds of elements. Up to now, no astronomical substances have been found exceptional, thus black hole should not be exceptional too. According to the calculation of the above black theory, the size of atom of substances in black hole is only one $10^{21\text{th}}$ of the size of atom of substances on the earth, obviously this is an absurd deduction. Because even reduce all atoms of substances in black hole to the size of neutron and put them together, the size of which shall be 1 million times

the theoretical size of black hole, so this deduction is obviously untenable.

The black hole theory also thinks that black hole absorbs other celestial bodies to make them a part of black hole. That is to say black hole can reduce the atom of celestial bodies absorbed by more than 10^{21} times in an instant. Obviously, this is a fantastic deduction violating human's common sense. The above statement shows that black hole does not exist in the universe at all.

At present, the researches on general theory of relativity about black hole, white hole and worm hole are leading scientific research to a dead end. The research direction deviating from the truth will block the development of science. Therefore, it must be pointed out that general theory of relativity is not an absolute truth and it is only applicable for analyzing object moving in low speed.

References Références Referencias

1. Set up Invariable Axiom of Force Equilibrium and Solve Problems about Transformation of Force and Gravitational Mass. Applied physics Research (Vol.5,No.1).
2. Guo, S. H. (2010). Electrodynamics. China: China Higher Education PressGuo, Y. Z,&Li, Z. X. (2011).Fundamentals of Applied Mechanics.
3. China: China Higher Education Press.
4. Zhang, Z. H. (2005).Fundamentals of principle of Relativity.
5. Beijing: Tsinghua University Press.
6. Internet, Baidu.com, black hole.