IOSR Journal of Applied Physics (IOSR-JAP)
e-ISSN: 2278-4861.Volume 11, Issue 1 Ser. I (Jan. – Feb. 2019), PP 07-11
www.iosrjournals.org

Outside Gravity of Spherically Symmetric Body Changes With Respect To Expansion And Contraction.

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Abstract: *One of stated that spherically symmetric mass distributive body attracts outside object, as entire mass were not concentrated at its center i.e. gravity changes with respect to expansion and contraction. It can be proved with various methods and one of them is explained here. Explanation is very simple to understand by anyone and this method can be used for outside as well as inside surface of spherically symmetric body. Every mass particle has gravity and it follows inverse square law. Spherically symmetric mass expansion or contraction is three dimensional function affected on outside gravity which is calculated with existing gravity concept and resulted as hypothesis.*

Keywords: *Acceleration, Classical Mechanics, Gravitation, Euclidean Geometry, Gravity measurement, Quantum Gravity.*

Date of Submission: 12-01-2019 Date of acceptance: 27-01-2019

I. Introduction

The aim of the present investigation is to prove that, outside gravity of spherically symmetric body changes with respect to expansion and contraction. That is the proof of 'gravitational field outside spherically symmetric mass distributive body is not as entire mass were concentrated at its center' as explained by Kolte [1-2].This explanation is easy to understand. Sir Isaac Newton had huge problem; [3] he had assumed that earth's gravity has its mass concentrated at center. Assumption is not bad approximation for moon but bad to apple. Newton knew that in general case a system of particles dose not exert gravity as through all the mass were at center of mass. However, this gravity equation is demonstrated with various derivations [3-9]. Initially shell gravity has explained shell theorem with help of thin circular ring of shell and its gravity equation [4-5].

In the present investigation, we have explained that expansion and contraction of spherically symmetric mass distributive body is the three dimensional function. Spherically symmetric body expands or contracts with respect to its center in X- axis, Y-axis and Z- axis, and these three functions are effective on outside gravity. All those existing derivations observed logically, mathematically with natural phenomena and focused on this concept with trigonometric ratio, shell theorem, Inverse Square law, gravitational constant and cosine law. Analyzed and resulted as hypothesis. Gravitational constant is a physical constant called universal Gravitational constant [10]. Fundamental physical constant or universal constant is a Physical quantity that is generally believed to be both universal in nature and have constant value in time [11]. Constant value in time indicates that structure of celestial object is same and relation between R and r is constant i.e. r placed at particular time of R (particular trigonometric ratios). We are going to explain that how the trigonometric ratio of spherically symmetric expanding mass changes for outside object, which is a consequence to change the outside gravity.

II. Experimental

Consider R radius and O centered spherically mass symmetric shell, which is expanded of point mass. P is the outside object located at distance r from shell center. Dispose the shell in thin circular rings in equal angel $d\varphi$ from $\varphi = 0$ to π. And we obtain rings of point mass or shell mass as concentrated or expanded. All the rings of shell are perpendicular to the line passing through OP having distance $r - R$ to $r + R$ from P. Each ring is exerting gravity with their gravity equation. Gravity distinguishes with calculating change in time square of point mass and expanded mass. Mainly three concepts are used here to prove hypothesis. First – Calculate and distinguishes the changes of Time Square of spherically symmetric expanding mass with angel θ. Second - Calculate resultant gravity of rings located at same distance from center of shell and then compare with point mass from center using the equation of shell theorem. Third – Contraction is the three dimensional function and hence each dimension affects on outside gravity. First of them all those rings go to the shell center decreasing gravity with increasing s^2 and second parts all those rings concentrate at shell center increasing gravity as s^2 decreases.

III. Results and Discussion

From the fig.1, here is O centered spherically mass symmetric shell having mass M. P is the outside object at distance r from shell center. Shell or point mass placed at center O is related to angle θ from P, and angle φ from center O. Shell or point are cutting thin circular rings in equal tiny angel dφ from φ = 0 to π and obtained the ring of point or shell as concentrated or expanded mass. Suppose point mass expanded and become R radius shell and ring N_1 is the ring which is to be found at center of shell expanded in angle dφ. Ring N_2, N_3 and N_4 having s_1, s_2 and s as well as r_1, r_2 and r correspondingly.

Mass of ring -

$$\text{Density x } 2\pi R \sin\varphi * R d\varphi \quad \text{----------------------- (1)}$$

$$\sin\varphi \text{ of ring } N_1 > \sin\varphi \text{ of ring } N_2$$

$$\therefore \text{Mass of ring } N_1 > \text{Mass of ring } N_2 \quad \text{----------------------- (2)}$$

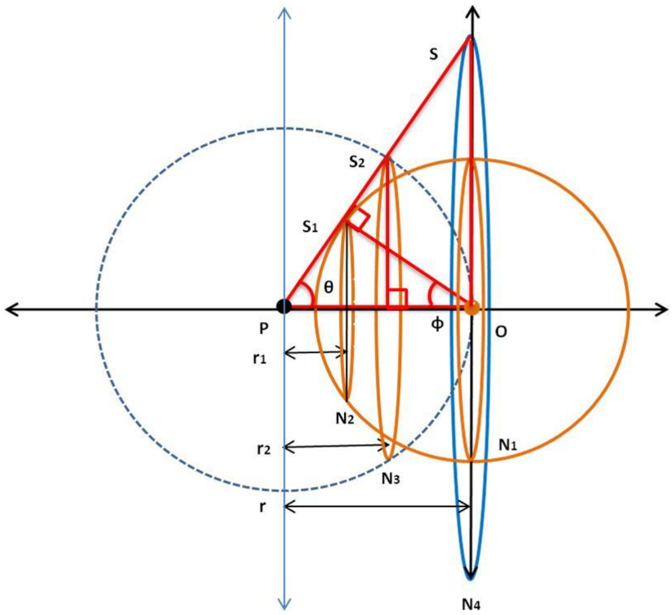

Figure1. Spherical symmetric mass of shell expanded with angel θ

3.1: Proof 1: Expanded mass fragmented with angel θ exerting gravity as compared to point mass from center.

When all the mass of shell concentrate at center as the point mass, then $\theta = 0^0$ and $\varphi = 90^0$. And ring N_1 situated at center has the least ratio of r and s (cosθ = 1) and so r = s where as compared to other rings ratios of point mass. Shell is the expansion of point mass at center O. We are going to explain that expanded mass exert gravity as compared to point mass from center. Mass of shell to be found at ring N_2 has least ratio of s and r (cosθ < 1).

Let ring N_2 shifted to center of shell keeping ratio constant and it becomes ring N_4 with increasing proportional mass, s^2 and r^2.

As per shell theorem, Gravity of ring is,

$$E_{ring} = \frac{G\, M_{mass\ of\ ring} * \cos\theta}{s^2} \quad \text{----------------------- (3)}$$

Mass /s^2 and cos θ of ring N_2 and ring N_4 are same, i.e. ring N_4 exerting gravity is equal to ring N_2 from the center of shell.

i.e. Gravity of ring N_2 = Gravity of ring N_4 ----------------------- (4)

Mass and s^2 of ring N_4 as compare to ring N_2 is as following.

$$Mass\ and\ s^2 of\ ring\ N_4 = \frac{Mass\ of\ ring\ N_2 * \cos^4\theta}{{s_1}^2 * \cos^4\theta} \quad \text{----------------------- (5)}$$

Inserting this value in equation (3)

$$\therefore\ E_{ring\ N_4} = \frac{G\, M_{mass\ of\ ring\ N_2} * \cos^4\theta * \cos\theta}{{s_1}^2 * \cos^4\theta} \quad \text{----------------------- (6)}$$

Here $\frac{\cos^2\theta}{{s_1}^2} = \frac{1}{{s_2}^2} = \frac{1}{r^2}$ Inserting this value in equation (6) and we get,

$$\therefore \; E_{ring\ N_4} = \frac{G\,M_{mass\ of\ ring\ N_2} * \cos^3\theta}{r^2 * \cos^4\theta} \text{ ---------------------- (6)}$$

Decreasing $\cos^3\theta$ from both side and ratio remain constant.

$$\therefore \; E_{ring\ N_4} = \frac{GM_{mass\ of\ ring\ N_2}}{r^2} * \frac{1}{\cos\theta} \text{ ---------------------- (7)}$$

This is the point mass of ring N_4 $\left(\frac{M_{mass\ of\ ring\ N_2}}{\cos\theta}\right)$ which is greater than mass of ring N_2 exerting gravity from shell center and it is equivalent gravity as ring N_2. Thus all the mass of shell fragmented with θ has least ratio placed at < r distance and it is exerting gravity same as equation (7). And from cosθ gravity is increasing as θ increases. This states that spherically symmetric expanded mass exerts gravity more than they are concentrating at center.

3.2: Proof 2: Rings of shell placed at equal distance from shell center exerting gravity as compared to point mass from shell center:

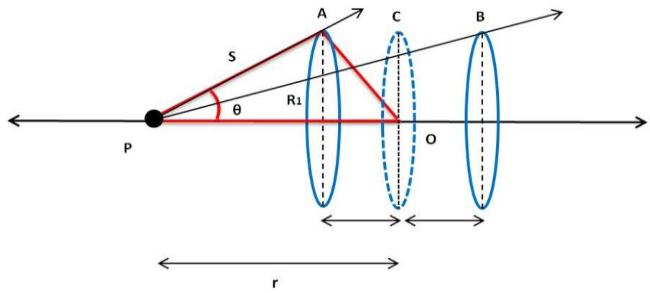

Figure2. Rings of shell placed at equal distance from shell center.

From the fig.2, ring of shell A and B placed at equal distance from shell center exerting gravity at outside object P. Ring A and B having same mass and different in θ; i.e. mass and s^2 ratio is different. Both rings come together at the center of shell (ring C) then resulted ratio mass and s^2 is changed and it's found between the said rings. Thus all the rings of shell expressed its mass and s^2 ratios from shell center also between them.

All the rings of shell come together at it center as ring C having radius R_1 and Limit of R_1 is 0 to R. Integrated entire ring ratio mass and s^2 over the limit R_1 = 0 to R are resulted between 0 to R (θ > 0) which is increasing with spherically expansion.

Integrated ring resulted between 0 to R (θ > 0) and ring gravity as per equation (3) then we get,

$$E_{Integrated\ \ ring} = \frac{GM_{mass\ of\ Integrated\ \ ring} * \cos\theta}{s^2} \text{ ---------------------- (8)}$$

Mass of integrated ring concentrate at it center increasing gravity due to s^2 decreases, and mass of integrated ring is equal to mass of shell.

$$\therefore \; E_{shell} = \frac{GM_{mass\ of\ shell} * \cos\theta}{r^2 * \cos^2\theta} \text{ ---------------------- (9)}$$

Decreasing cos θ from both sides and ratio remains constant

$$\therefore \; E_{shell} = \frac{GM_{mass\ of\ shell}}{r^2} * \frac{1}{\cos\theta} \text{ ---------------------- (10)}$$

OR

Calculated resultant ratio mass and s^2 of rings placed at equal distance from shell center for constant mass and found that they are placed together at less than r distance. Thus all the rings ratios are also less than r distance. Hence resultant ring (all rings concentrate at this ring) for total mass of shell also placed at < r distance which gives us a shell gravity. Gravity of ring is as equation (3) and suppose ring N_3 (fig.1) is the resultant ring inside the shell having ${s_2}^2 = r^2$. Hence gravity of resultant ring N_3 is,

$$E_{resultant\ \ ring\ N_3} = \frac{GM_{resultant\ \ ring\ N_3} * \cos\theta}{{S_2}^2} \text{ ---------------------- (11)}$$

$$({s_2}^2 = r^2)$$

$$E_{resultant\ \ ring\ N_3} = \frac{GM_{resultant\ \ ring\ N_3} * \cos\theta}{r^2} \text{ ---------------------- (12)}$$

Equivalent gravity as resultant ring N_3 from center of shell is as ring N_4.

$$\therefore\ E_{ring\ N_4} = \frac{GM_{mass\ of\ resultant\ \ ring\ N_3} * \cos\theta * \cos^2\theta}{S_2{}^2 * \cos^2\theta} \text{ ---------------- (13)}$$

$$(S^2 = \cos^2\theta / s_2{}^2)$$

$$\therefore\ E_{ring\ N_4} = \frac{GM_{mass\ of\ resultant\ \ ring\ N_3}}{S^2 * \cos\theta} \text{ ---------------------- (14)}$$

Equation (14), ring N_4 concentrate at it center with their cosθ and ratio remain constant.

$$\therefore\ E_{Concentrated\ \ ring\ N_4} = \frac{GM_{mass\ of\ resultant\ \ ring\ N_3}}{r^2} \text{ ---------------------- (15)}$$

Values of equation (11) and (12) are equal as well as equation (11) and (15) are equal consequently equation (12) and (15) also equal. From equation (12) and (15) outside gravity at P is same for mass M $* \cos\theta$ of shell and mass M of point. This states that concentrated mass and spherically symmetric expanded mass exerts gravity differently and it is increasing as θ increases. That is as equation (7) and (10).

3.3: Proof 3: Contraction is the three dimensional function and hence each dimension affects on outside gravity.

OR

Point mass at center exerting gravity as compared to expanded mass.

As per universal gravitational law Gravity of spherically symmetric mass is,

$$E = \frac{GM}{r^2} \text{ ---------------------- (16)}$$

From equation (16), spherically symmetric expanded mass exerting gravity as all mass concentrate at its center, but concentration is the three dimensional effect of cosθ. Mass concentrate at center from Y- axis and Z- axis are increasing gravity where as X- axis decreasing for observer at X- axis. Inserting cosθ value in equation (16) and shell is a spherically symmetric mass,

$$E_{shell} = \frac{GM_{mass\ of\ shell} * \cos^2\theta}{r^2 * \cos\theta} \text{ ---------------------- (17)}$$

Decreasing cos θ from both sides and ratio remains constant

$$\therefore E_{shell} = \frac{GM_{mass\ of\ shell}\ * \cos\theta}{r^2} \text{ ---------------------- (18)}$$

Suppose mass accumulates in point then cosθ = 1, i.e. mass shifted from s to r is nothing difference from X- axis Y- axis and Z- axis. Inserting the cosθ value of point mass in equation (17) or (18) and resulted as equation (16). Consequences of contraction are opposite to expansion.

Equation (18) is the similar equation as ring gravity which is used in shell theorem; actually the equation comes from shell gravity or spherical symmetric expanded mass gravity. Equation shows that all the mass of shell (spherically symmetric expanded with angel θ) concentrates at shell center and its resultant gravity becomes as point mass ($\frac{GM}{r^2}$) using cosθ. From equation (18) we conclude that mass expanded with θ and mass concentrate at center exerting gravity has difference with cosθ. We required value of cosθ to make shell gravity as equal to point mass from center. Hence shell gravity is greater than point mass at center and that is as equation (19). This states the hypotheses.

$$\therefore E_{shell} = \frac{GM_{mass\ of\ shell}}{r^2} * \frac{1}{\cos\theta} \text{ ---------------------- (19)}$$

IV. Conclusion

From all above proofs, outside gravity of spherically symmetric body are changes with respect to expansion and contraction. This result is different from existing. From all those above proofs and equation of ring gravity, we conclude that gravity equation must have contained cosθ. Here it is assumed that earth (celestial body) mass concentrates at its center, but we observed spherically symmetric mass expanded earth gravity on its surface, therefore cosθ applied and we get same gravity as point mass from less quantity of spherically symmetric expanded mass.

Observed Gravitational constant has contained volume, mass and Time Square. Gravitational constant shows that mass contained in volume has time square. Time square kept constant in Gravitational constant therefore gravity changes with mass and volume. Hence we always obtain gravity of particular time square which indicates that spherically symmetric expanded mass enclosed in particular θ and it always resulted in particular cosθ. Thus effect of expansion and contraction is exited out of gravity calculation and every time derived that gravity is related to mass and r^2. We observed earth gravity on its surface with gravity equation hence elsewhere wrong because earth is a celestial object, it is creating gravitational flux universally proportional to its surface and hence time square plugged in universal gravitational constant G (proportionality constant) which is only related to its surface and that's why elsewhere wrong.

Shell gravity demonstrated by shell theorem with its ring equation, but from the equation (18), it comes from spherically symmetric expanded mass. Here is every ring considered as a independent spherically symmetric mass concentrated in the ring and then integrated over the limit r - R to r + R. therefore contraction along with X- axis is repeated and nullify the variation of s^2 and every time $s^2 = r^2$ remain constant. Outside gravity of spherically symmetric mass distributive body is always related to mass and r^2 although its uniform contraction or expansion is occurred, but its relation changes, which is changing the gravity as Hypothesis.

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IOSR Journal of Applied Physics (IOSR-JAP) is UGC approved Journal with Sl. No. 5010, Journal no. 49054.

Uttam Kolte" Outside Gravity of Spherically Symmetric Body Changes With Respect To Expansion And Contraction..” IOSR Journal of Applied Physics (IOSR-JAP) , vol. 11, no. 1, 2019, pp. 07-11.