Gravity

Soorajlal Vijayan

Abstract— In this paper I have tried to explain why force of gravity varies as we go from equator to poles.

Index Terms— Absorption of force, persistence of radial outward force, resultant forces.

INTRODUCTION

I have tried to explain what is force of gravity and why force of gravity varies as we go from equator to poles. With a hypothesis I try to point to the fact that why force of gravity don't cancel each other.

Explanation for the reason for force of gravity

Every action has an equal and opposite reaction. If we push a wall with our hands we experience an equal and opposite force. But if we push a 10kg block and gradually increase the force applied we experience an equal and opposite force till the block start moving. So the opposite reaction is nothing but absorption of the force applied.
I propose the concept of absorption, **A.** Absorption is defined as the force per unit volume. Force is gradient of energy.
So Absorption, A= **F/V** [unit is **kg** $m^{-2}s^{-2}$] ----------------------- **(1)**

Absorption takes place in a mass if the relative velocity of gradient of energy and the mass containing that energy is **not zero**.

There will be no force without energy. But there can be energy with out force acting, ie; if gradient of energy is zero, there will be no force acting.

Experiment (absorption)
If I punch on a wall it pains my hand. With the same force if I hit on a steel wall it pains me more. Why is it so if there is no change in position. I call this phenomenon as absorption.
So, for every action there is equal and opposite reaction is not correct. It is, reaction for every action is directly proportional to product of density of body on which the force acts and other external force acting on the body in opposite direction to the direction of 'applied force' or 'action'.

Force, **F=Energy,E/Distance,r**
F.r=E

But when r=0, in absorption
F.r≠0 but |**F**|=|**E**|.

A= **F/V,** if A=0 , it means gradient of energy is 0. ie; no energy loss.

Limit of absorption without motion, L_A of mass

The limit of absorption without motion of mass is till a resultant force which is normal to the opposite surface of surface on which the force is applied emerges out.
If we consider a mass in which no internal force acts and no external force acts for that mass $L_A=0$. It means if we apply a force, F> 0 Newton, it will set that mass into motion.

Mostly for planets, $A=A_R+A_H$, where A_R is due to rotation of the planet and A_H is due to heat in the planet.

Assumption (force equally spreads with in a mass)

In case of circular motion radial outward force is mv^2/r= **(velocity.ϱ.v²)/r,** where r is the radius for circular motion. As we consider unit masses from d=0 to d=r, the tendency of the unit mass to get detatched from the previous unit mass increases with distance and decreases with density,**ϱ**.
ie;tendency to get detatched ∝ **d/ ϱ**.
It means for the same mass and density varying the same force spreads across the volume which varies with density. So if we consider the unit mass there is spreading of force across the volume. So the force in a unit mass can be assumed to spread equally in all direction. Force is nothing but gradient of energy.

Absorption due to heat, A_H

Rate of change of heat energy is given by
$Q/t= [C.A(T_1-T_2)]/l$, **C** is the thermal conductivity and l is the distance between the points at which the temperature T_1 and T_2 is measured.

$F_t= Q/l= t.[C.A(T_1-T_2)]/l^2$

$A_t= F_t/V_T= t.[C.A(T_1-T_2)]/[l^2.V_T]$

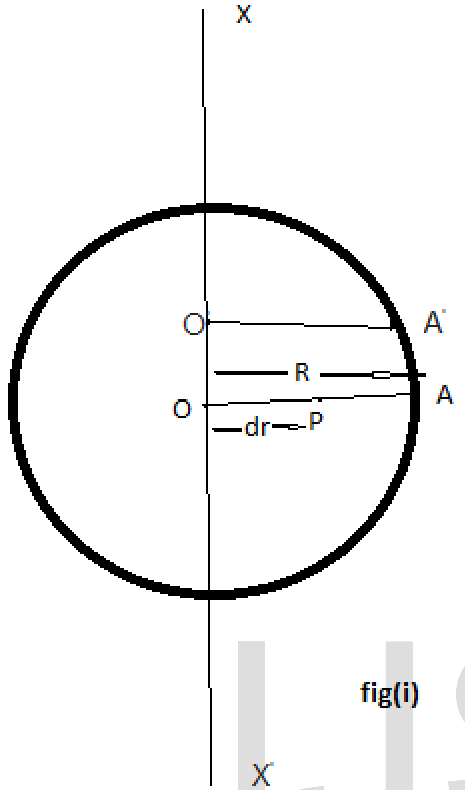
$= \varrho\, t.[C.A(T_1-T_2)]/[l^2.m_T]$, where ϱ is the density of the mass.

Now,
$A_R= F\varrho/m$ --------------------------------**(2A)**

F/m is a constant, and

$A=A_R+A_H$. --------------------------------**(2B)**
Now,
consider a planet whose radius is R and rotates on its axis XX′ with angular velocity, ω, fig i

ISSN 2229-5518



fig(i)

Let P be a point at which a unit mass, m is present. Let OP=dr. Now the force acting at point mass is given by,

$F_P = m v_P^2/dr = m.dr.\omega^2$ --------------------------------(3)

Force F_P, according to absorption spread in all direction equally since the mass have same density through out so as to from a spherical shape in which the force spreads.. Since it is a force due to rotation the force spreads in spherical half in the direction of rotation.

Volume in which F_P spread is given by,

$V_P = (2/3).\pi.d^3$, where **d** is the distance the force moves from point source.

From **(1)** and **(3)**

$(2/3).\pi.d^3 = (m.dr.\omega^2)/A$

$d = [(3/2\pi).(dr\ \omega^2)/A]^{1/3}$ --------------------------------(4)

From the above equation the shape of the volume in which the force spreads can be drawn using

$d \propto dr^{1/3}$

Now, consider the force along O′A′, it will have the same shape.

looking normal to the axis XX′ and OA

It will be as shown in fig(iiA)

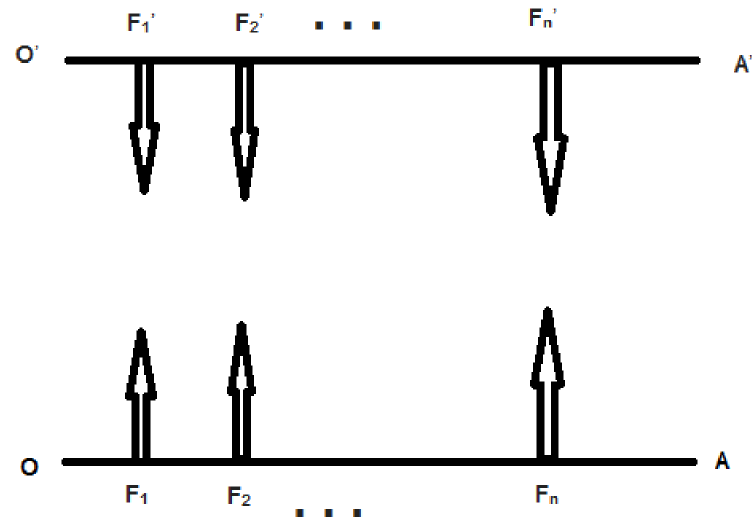


fig (iiA)

$F_1=F_1'$, $F_2=F_2'$, … , $F_n=F_n'$.

They cancel each other and hence there will be no force acting in a direction parallel to the axis XX′ due to rotation.

looking to XX′ along the line OA in the direction AO

It is shown in fig(iii).

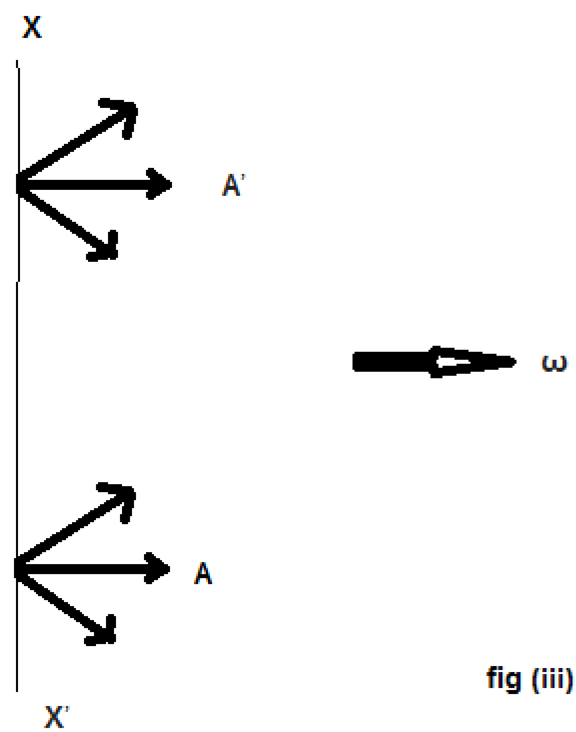
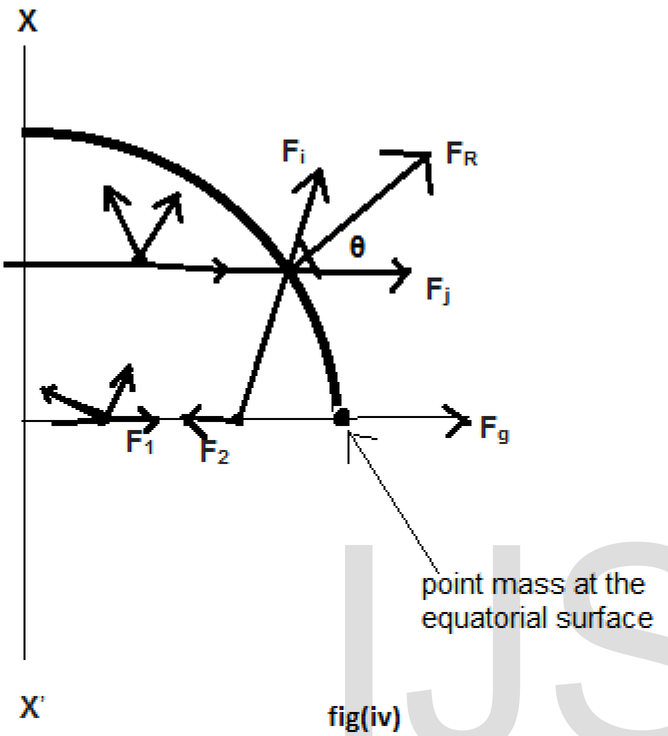


fig (iii)

No force acts along XX′ due to rotation and all other forces will have resultant.

<u>now consider the curved surface of the planet</u>

It is shown in fig(iv).



fig(iv)

Consider some point masses. There will a resultant force F_R which is normal to the surface which is a result of many number of resultant forces. These resultant forces are the resultant of n number of forces, F_i and F_j where **i= 1,2, … ,n** and **j= 1,2, … ,n** and they are at an angle θ_i.

So, $F_R = \Sigma_{i=1 \text{ to } n} F_{Ri} =$

$$\Sigma_{i=1 \text{ to } n} [(F_i)^2 + (F_j)^2 + 2.F_i.F_j.\cos\theta_i]^{1/2} \quad \text{----------------(5)}$$

This F_R is the force of gravity at that point.

<u>$F_2 > F_1$,fig(iv)</u>

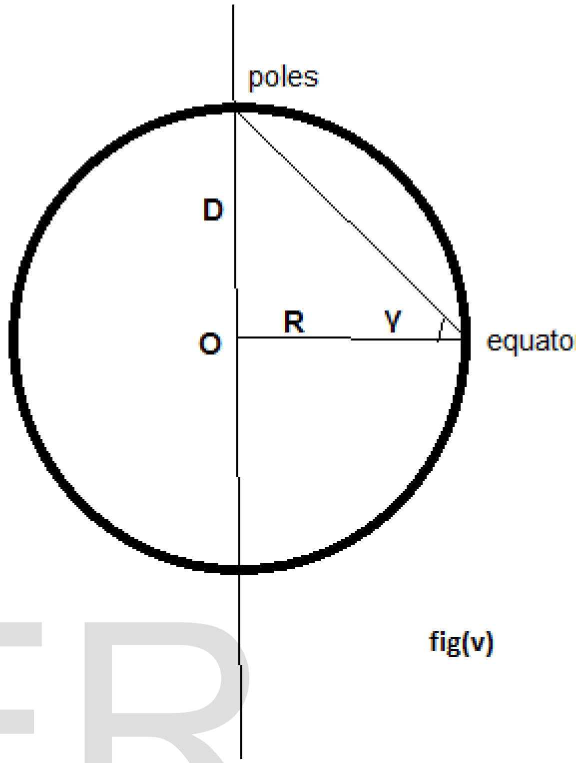
So a force $F_2 - F_1$ acts perpendicular to XX′. Sum of n number of difference of these forces is the radial outward force.
So if 1,2, … ,n represents the unit masses in the line normal to XX′ then the radial outward force will be

$$F_{radial} = (F_2-F_1) + (F_3-F_2) + (F_4-F_3) + \ldots + (F_n-F_{n-1})$$

$$= \Sigma_{i=2 \text{ to } n} (F_i - F_{i-1}) \quad \text{--------------------(6)}$$

<u>**Now consider the case of earth**</u>

From fig(v),



fig(v)

If **R=D**, then $\gamma = 45^0$,

but , **D=R-22 km** so $\gamma = 44.90090363^0$,

so a variation of 0.099096374^0.

This variation of angle is affected to θ_i for F_i and F_j at poles. As a result $\theta_i = \theta_i - 0.099096374^0$

So if the F_R at poles is F_{RP} and F_R at equator or at other parts is F_{RE} then

$F_{RP}/F_{RE} > 1$.

From **(4)** the distance a force is absorbed from its source is directly proportional to **dr**, ω^2, and A^{-1} and from **(2A)**
ie; $F \propto [R\, \omega^2 / \rho]$ --(7)

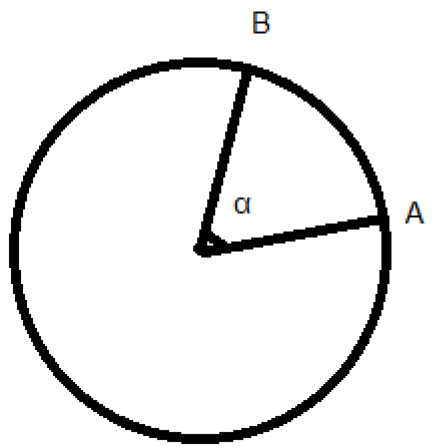
This result specifies that the force of gravity of a spherical object for a particular value of absorption, **A** and is rotating depends on its

1) Radius
2) Angular velocity and
3) Density

ISSN 2229-5518

Persistence of radial outward force

Consider a circular freely rotating body, shown in fig (vi)



fig(vi)

$|F_A|=|F_B|$, where F_A is the radial outward force at A and F_B is the radial outward force at B.

Let the radius be r and angular velocity be ω.

According to my hypothesis there is a phenomenon called the persistence of radial outward force. The persistence will be for a time t_p.

Since the circular body is rotating the point at which F_A is visualized also moves. And at a time $t<t_p$ if the point at which F_A reaches the position B then the rotating body is said to be in unstable state. So if **t>tp** then the rotating body is said to be stable.

When $t=t_p$, it is at the ending edge of stability and at the starting edge of instability.

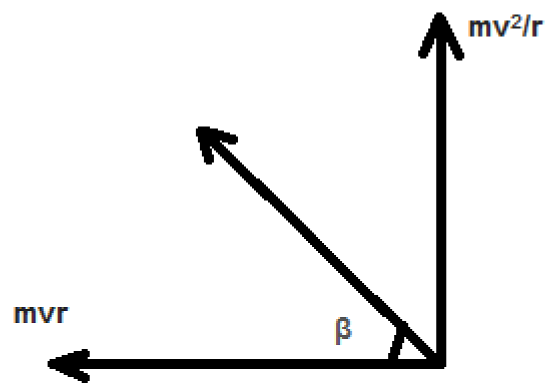
Calculation of α

$AB= r\,\alpha$
velocity, $V_A= r\,\omega$
At $t=t_p$
$AB/V_A = \alpha/\omega = t_p$
$\omega= 2\pi/t_p$ ------------------------------------**(8)**
ie; $\alpha= 2\pi$
At $t=t_p$, d=R and dr=R.

Then from **(4)** and **(8)** we can get the value of t_p and hence ω_p can be calculated.

On the basis of this my hypothesis is that the force of gravity is wave whose time period is t_p or depends on t_p. Different masses have different t_p.

Equation (persistence of radial outward force)



When $t=t_p$ persistence of radial outward force, $t_p \propto \tan(\pi/2 - \beta)$

m is the mass of the body in rotation, v is its velocity and r is the radius of rotation.

steps

$\tan\beta= (m.v^2/r)/(m.v.r)$

since, $v=r.\,\omega$,
$\tan\beta= \omega/r$.

then, $\tan(\pi/2 - \beta)=r/\omega$.

If α is the angle subtended by point AB in fig(vi) then,
$\omega=\alpha/t$, where t is the time took to subtend angle α. Then

$\tan(\pi/2 - \beta)= (r.t)/\alpha$

At, $t=t_p$, $\alpha=2\pi$,

then, $t_p = [2\pi.\tan(\pi/2 - \beta)] / r$.

The resultant of force of gravity from the sun and earth is the result of elliptical orbit of moon around the earth. Similarly the reason for elliptical orbit of earth around the sun is the result of sun's rotation around something else.

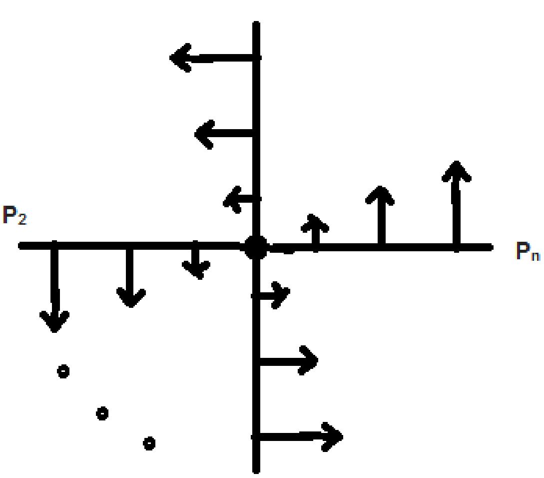
Assumption

If we assume that the earth rotates at an angular velocity, ω_p then all the earth will be at a point of getting detatched from each other, ie; it will get disintegrated into dust particles. I think it would be the same angular velocity at which the particles would have rotated to form earth. So it was not the particles fell into vaccum to form earth like planet and started to rotate but, at high energy, particles in rotatory motion loose energy and as they loose energy they came close to each other and correspondingly increase in density (assuming there is no loss of mass) and decrease in angular velocity took place gradually and at a point everything came to a stable point when earth acquired angular velocity to complete one rotation in 24 hrs approx.
If this is correct, the funny thing is if we continuously and massively depend on fossil fuel it can vary the number of days we live with out varying the number of seconds we live.

Now the question arise is that will the heat produces within a planet adds to the gravitational force of that planet? If so from where that heat is produced?
Answer is yes and it is a part of energy from the sun. Some part of heat energy from the sun is converted to mass. So an equal amount of mass is converted to energy keeping the overall energy a constant.

so, why a planet rotates?
$\omega = 2\pi/t_p$ is the angular velocity at which the mass is dispersed into many particles. The reverse thought is it was the angular velocity at which matter rotated at the starting of formation of earth and ω got reduced to the present angular velocity of the earth. It means R was reduced and average density increased. Actually it is its stable state and continues to be in this state.

From fig(vii)



fig(vii)

$P_1, P_2, \ldots, P_n$ are planes formed by the same plane of point masses which are at a distance dr from axis XX′. The resultant of the forces perpendicular to these planes will form a rotator force that continues the rotation of earth.
Now the question is if a part of rotational energy is used for rotation the there should be in balance of force. Yes it is right..
The answer for it is as follows..
According to Einstein's mass energy equivalence, $E=mc^2$
When a mass is converted to energy heat is released. If some one tells energy is released but it is heat, I shall ask a question, is heat the only form of energy. I think no one will say 'yes'. So some one can say heat is by product of energy. But I will say heat is that which converts energy to mass. So heat is released when mass is converted to energy.
So if sufficient amount of cold is introduced that mass will get converted to energy. So poles play an important role. So disintegration of mass to energy takes place within the earth mainly under the poles. This energy gradient adds to the gravity and rotation. When disintegration of mass is greater than energy to mass conversion, from **(7)**, **F** increases. Since **R** and ρ being constant it should increase ω. But for that extra force produces it will be easy for that energy to come out of if that to increase the speed of rotation of earth which we can see as volcanic eruption. So if volcanoes doesn't erupt it can lead to the destruction of earth.

Acknowledgment

Sincere thanks to all members of IJSER. And I really appreciate your eagerness in care for your authors.

References

1) Benjamin J. Engineering Mechanics. Pentex Book Publishers and Distributors, kollam, kerela, India, 2003

2) Physics NCERT text book for HSE education, India.

3) Sura's Logarithmic Tables: Science Data Book