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Review Paper

Gravity: the effect of compressed space-time medium

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Abstract

The space-time medium is the combination of time and distance in which all the static and kinetic motions of objects occur, where time and distance show's flexibility, i.e. The distance between two points can be compressed or expand when it is disturbed by the massive body/planet. A massive body in space occupies the space in a space-time medium which in result compresses the space-time medium around it. The compression in space-time is directly proportional to the density of a body spread in particular area, i.e. (Compression α density × surface area of the body), this compression in medium follows "law of conservation of relative motion" and "space-time medium interaction" which results into mutual attraction between two bodies. Amazingly the final mathematical expression is same as Newton's law of gravitation. Einstein's general theory of relativity explains gravity as a "Distortion of space (or more precisely, space-time) caused by the presence of matter or energy. A massive object generates a gravitational field by warping the geometry of the surrounding space-time". Newton's law of universal gravitation states that "every mass attracts every other mass in the universe, and the gravitational force between two bodies is proportional to the product of their masses and inversely proportional to the square of the distance between them". But both the theories do not describe the reason behind the attraction between masses. Here, the most suitable theory of attraction between the masses is explained. All the terms and laws are explained here with Mathematical expression.

Keywords: Einstein's general theory of relativity, Newton's law of universal gravitation, Space-time medium.

Introduction

Newton's law of universal gravitation states that "every mass attracts every other mass in the universe, and the gravitational force between two bodies is proportional to the product of their masses and inversely proportional to the square of the distance between them"[1]. According to Einstein's general theory of relativity, which explains gravity as a "Distortion of space (or more precisely, space-time) caused by the presence of matter or energy, A massive object generates a gravitational field by warping the geometry of the surrounding space-time"[2]. But both the theories do not explain why two masses attract each other? To effectively understand this, one has to understand the space-time medium.

Space-time medium

Assume any object is moving in a space with constant velocity 'v' in a particular direction and it takes time 't' to travel some distance 'x' in space. Assume another object is at rest, but still it will spend some time in space in rest condition. The stationary object will stay in one position while moving object will change its position in space and both the objects will spend some time in space. Hence, one can say that the objects are situated in a combination of space and time, which can be termed as a space-time medium.

So we can state, "Space-time medium is the combination of Time and Distance in which all the static and kinetic motions of objects occur"[3]. The proportion of space and time in space-time medium varies with different conditions, i.e. Time and distance are flexible i.e. the distance between two points compress or expand with respect to center of universe in respective condition. Ex: A massive body occupies some space in space-time medium, which in result compresses the space-time medium around it[4]. The solid molecule of planet occupies the space and form a rigid body. This body as a whole occupies some space and in result compresses the space-time medium around its surface. The compressed space-time medium is highly unstable, so it always tends to expand the space away from the surface of the massive body / planet, but the normal space-time medium resists the further compression, as the normal state of the space-time medium is the most stable state for space[5].

The compression in space-time is directly proportional to the density of the body, i.e. more the density of a body more the compression of space-time medium[6]. The range up to which the mass is spread also affects the compression in the space-time medium. Assume that the body is spherical in shape, then space-time compression depends on the surface area of body[7]. Hence we can state that, compression in space-time medium is directly proportional to density and area of the body. The length by which the unit distance of space-time medium is compressed is denoted by "Δ". Let δ be density, M be mass, V be volume, and R be radius of the spherical body. So we have:

$\Delta\ \alpha\ \ \delta\ .\ (\text{Area})$

$\Delta\ \alpha\ \ \delta\ .\ 4\ .\ \pi\ .\ R^2$

$\Delta\ \alpha\ \frac{M\ .\ 4\ .\ \pi\ .\ R^2}{V}$ Substituting value of density

$\Delta\ \alpha\ \frac{3\ .M}{R}$ Substituting value of V we get

$\Delta = C.\ \frac{3\ .M}{R}$

$\Delta = C1.\frac{M}{R}$ Taking 3.C = C1

Compression in space-time medium is directly proportional to the mass and inversely proportional to the distance of point from the center of the body / planet.

Calculations regarding compression in medium: Assume a planet of radius R and mass M. Compression at distance r from the center of the planet will be:

When r > R or r = R:

$$\Delta = C1.\ \frac{M}{r} \tag{1}$$

Δ is zero where r is ∞, hence space-time compression decreases from surface to infinity.

When r < R: On moving down without digging the hole in the surface of the planet, the space-time compression will be constant. Every massive body/planet is made up of small particles. These tiny particles have some small space in between them. They do not form completely packed structure when observed on a microscopic scale. This space between the molecules is also compressed. If we assume the molecules are uniformly distributed in all over the volume of the body, then each of the molecule will compress the space-time medium around it. Due to uniform distribution of molecules the compression in the space-time medium between the molecules will be same in all over the volume of a massive body. Hence Δ will be constant inside the planet.

But if we move down into the surface by digging a hole, in this digging process the material inside the surface will be shifted on the ground surface. Assume the hole is cylindrical then the compression at the bottom of the hole will be due to mass present at the bottom and the inner curved surface. So it is very difficult to calculate the space-time compression below the surface of the massive body / planet. One can understand the space-time medium compression from following illustration.

Illustration 1: Assume three linear points A, B and C. The positions of point are fixed with respect to the center of the universe. The distance between point AB and BC is 6 and 4 unit distance respectively. Now a block of mass M is allowed to travel from A to B with constant velocity V1. This experiment will be performed in two cases:

Case 1: Motion in a medium with no space-time compression: In this case the block will take t1 time to travel from A to B with constant velocity V1. The velocity equation can be written as,

$$[V1 = \frac{6\ unit}{t1}]. \tag{2}$$

We can represent the above situation by distance line diagram, as shown below. Figure-1 represents the distance line diagram when there is no compression in the space-time medium. Each vertical line represents a distance line with 1 unit distance between them. Assume there are 5 distance lines between A and B and 3 distance lines between B and C. So system contains total 11 distance lines named as P, Q, R, S, T, U, V, W, X, Y, Z from C to A and total distance between point A and C is 10 units. When body travels from A to B it travels 6 unit distances with respect to the center of the universe.

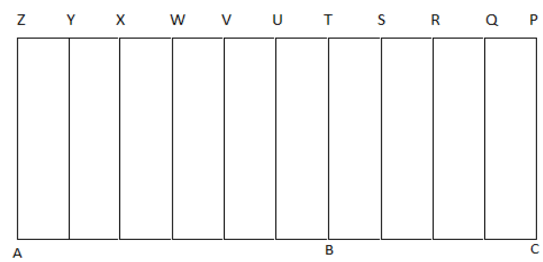

Figure-1: Line diagram of the space-time medium, when there is no compression.

Case 2: motion in compressed medium: The object occupies the complete space from B to C such that distance line P shifts from point C to point B. (Assume the ideal situation such that at point A the compression due to object is small, hence distance line Z will not shift its position). So we will observe following changes in distance line diagram.

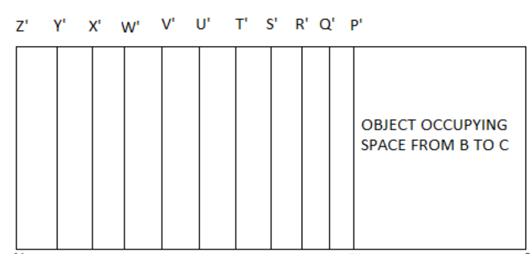

Figure-2: Line diagram of the space-time medium in compression due to massive body.

From Figure-2 we can see that the distance line P shifts form position C to B as the area between B and C is occupied by the object. After the change in positions the points are named as A', B', C' and the lines are named P', Q', R', S', T', U', V', W', X', Y', Z' resp. (Assume the object is rigid and compact). Now, the block will travel from A' to B'. On actual observation, we will see, the block has travelled the distance same as A to B but with respect to the center of the universe the block has travelled the distance same as A to C in Figure-1. So this time the block has travelled 10 unit distance. But the time taken by the block to cover this distance is same as in the case 1, i.e. t 1.

Now one must note that the space-time medium is compressed in such a way that the distance A'B' is equal to AC, also the compression in medium decreases from B' to A'. With respect to general observation: [P'Q'<Q'R'<R'S'<S'T'<T'U'<U'V'<V'W'<W'X'<X'Y'<Y'Z']. Now with respect to center of universe positions of two consecutive lines is changed, but they are still 1 unit distance apart in compressed form, i.e.: [P'Q'=Q'R'=R'S'=S'T'=T'U'=U'V'=V'W'=W'X'=X'Y'=Y'Z'=1unit]. Let T be the time taken by the object to travel the distance between two corresponding lines, then: [TP'Q'<TQ'R'<TR'S'<TS'T'<TT'U'<TU'V'<TV'W'<TW'X'<TX'Y'<TY'Z']. When block will start moving with an initial velocity of V1 then its velocity will increase as time taken to travel one unit distance with respect to center of universe decreases. Let V2 be the final velocity of block at point B' Hence we get:

[V1 < V2] (3)

I.e. from A to B, due to the presence of massive object the velocity of the block is increased.

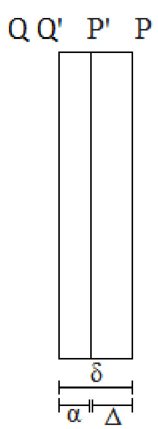

Figure-3: Comparison in position of P-Q in Figure-1 and P'-Q' in Figure-2.

Comparing the positions of distance lines P and Q in Figure-1 and P' and Q' in figure-2 as represented in Figure-3 we have:

δ: initial 1 unit distance when there is no compression in space-time medium, from A to B δ is constant. Here it is the distance between lines P Q. α: final distance after compression in space-time medium, from A' to B' respective α decreases. Here it is the distance between lines P' Q'. Δ: length by which the space-time medium is compressed or compression in space-time medium, from A to B respective Δ increases. Here it is the distance between lines P P'. From above illustration 1, we can state that on moving from A' to B' the rate of change in velocity with respect to time "t" is directly proportional to the rate of change in α with respect to distance "x" from center of the planet.

$$\frac{dV}{dt}\ \alpha\ \frac{d\alpha}{dx}$$

$$\frac{dV}{dt} = C2.\frac{d\alpha}{dx}$$

$$\frac{dV}{dt} = C2.\frac{d(\delta-\Delta)}{dx}$$ From Figure-2 ($\alpha = \delta-\Delta$)

As δ is constant, substituting value of Δ from (1) and further differentiating, we get:

$$\frac{dV}{dt} = a = C1.C2.\frac{M}{R^2}$$ a = acceleration

$$F = m.\ a = C1.C2.\frac{Mm}{R^2}$$ m = mass of any object (4)

The above equation is exactly similar to the Newton law of gravitation.

$$F = G.\frac{Mm}{R^2}$$

We get "C1.C2 = G"

The above illustration reveals that any object moving towards the massive body starts accelerating towards the surface, as compression in space-time medium increases on moving towards the surface.

Gravity

In illustration 1: case 2, the block is given an initial velocity V1, so on moving from A to B its velocity increases (equation 3), but what if the block is placed in space time medium with no initial velocity? Still the block will start moving toward the planet. This phenomenon can be explained by "law of Conservation of Relative Motion".

Law of Conservation of Relative Motion

"If one element (massive or mass less) is moving relative to another element initially at rest and they are interacting with each other by direct contact or any attracting or repelling force, if moving element is brought in rest without loss in energy and without disturbing the power source, then another element in rest will start moving in such a way that the relative motion between them will remain conserved"[8]. This can be explained by taking an example of the simple construction of an electric motor.

Illustration 2: Assume a simple construction of an electric motor as shown in Figure- 4. The system is placed in vacuum and zero gravity.

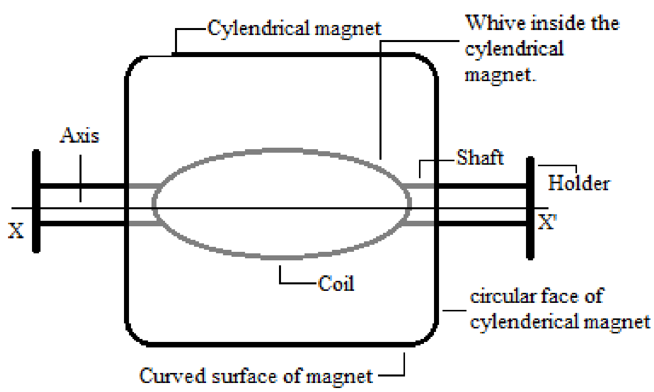

Figure-4: Simple construction of electric motor.

A simple motor contains a conducting coil and a cylindrical magnet. The coil will produce an electromagnetic field, when voltage is applied. Now the magnetic field of the magnet and electromagnetic field of the coil will interact, causing a relative rotational motion between them. Let initially the magnet is held at rest and the coil is allowed to rotate about the central axis XX'. Now if we release the magnet and slowly stops the motion of the coil without disturbing the flow of current then the magnet will start rotating in the opposite direction about same axis XX'. This is the obvious behavior shown by the magnet as it is still interacting with the current carrying coil by magnetic field forces. So here magnet and coil are the two elements and they are interacting with each other by the magnetic and electromagnetic field forces. Initially the coil was rotating about the axis XX' (assume in clockwise direction) and the magnet was at rest. When we slowly stop the motion of the coil, the magnet starts rotating around the axis XX' (in anticlockwise wise direction), Such that the relative motion between magnet and coil will remain conserved. It must be noted that there is no external force acting on the system.

The law of conservation of motion is also applied to the object and the planet system. Here the object near the planet is one element and another element is compressed space-time medium. The compressed space-time medium always tends to expand away from the surface of the planet, but the outer space-time medium does not allow the compressed region to expand, as the space-time medium in the normal state is the most stable.

Space-time interaction

"When an object enters into the compressed space-time region, it forms the system of two elements i.e. Object and compressed space-time medium. Both the elements come in direct contact and they start moving relative to each other, this interaction is termed as space-time interaction"[9]. As the compressed space-time region always tends to expand away from the planet but its expansion is resisted by an outer space-time medium, so according to the law of conservation of relative motion the object will start moving toward the surface of the planet and according to Equation (3) the motion of an object will be accelerating. Like this, two bodies get attracted towards each other following "law of conservation of relative motion" and "space-time interaction".

Conclusion

Space-time medium gets compressed around the surface of massive objects / bodies. This compression in space-time medium is directly proportional to density and inversely proportional to surface area of massive objects, after simplifying the equation for compression in the space-time medium we get: [$\Delta = C1.\frac{M}{x}$], Where: (delta) = length by which space-time medium is compressed. M is the mass of an object and x is the distance from center of the planet. Gravitational acceleration 'a' for any planet or massive object is directly proportional to the rate of change on the planet with respect to distance from the center of the planet, which on further simplification gives the equation: [$a = C1.C2.\frac{M}{R^2}$], Where: C1 and C2 are constants. The equation for gravitational acceleration is similar to Newton's law of attraction, which gives: [C1.C2 = G]. The compressed space-time medium always tends to expand away from the surface of the planet / massive body. Any object around the planet / massive body interacts with compressed space-time medium such that the object and compressed space-time medium starts moving relatively, this is termed as "space-time interaction". So the object will start moving towards the surface of the planetary / massive body to conserve the relative motion with compressed space-time medium. This is termed as "law of conservation of relative motion".

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