The Gravitational Drag Effect:
A New Theory of Gravitation

By

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Abstract

The main characteristic that unites all gravitational fields and theatres is the constant rotation of a point around an axis. Such a rotation can distort the reality of motion. Objects may appear to be stationary while, in reality, may be moving faster than the speed of light. Frame dragging commonly refers to a field which appears to be stationary while moving in an orbit around an axis. Different types of orbits can also cause a dilation of time which can confuse astronauts and passengers who fly on airplanes. Time dilation refers to a change in a time which is perceived by a passenger within a frame that is moving in an orbit around the central axis of the Earth. A passenger can look at a watch while traveling from New York to California and will notice that only three and a half to four hours have passed in such a trip. He may notice that he left New York at 3:00 p.m. in the afternoon and that it is still 3:00 pm when he gets off of the plane, contrary to what is watch is telling him. This paper will discuss basic issues that deal with the phenomena of Frame Dragging and distortions in time which result from an orbit around the Central Axis of the Earth.

Part 1

Basic Concepts in Gravitation on Earth

Section 1.1

Points on the Planet

What is the Central Axis of a planet?

The Central Axis of planet is a cylinder that does not rotate around any other object. All objects within a gravitational theatre rotate around this cylinder. This cylinder may be invisible. It passes through the North Pole, the South Pole and the center of the earth. It does not contain any points on the equator.

What is the North Pole?

The North Pole is the point on Earth that is closest to the Central Axis of the Sun during the summer solstice. It is part of the Central Axis and does not rotate around the axis itself.

What is the South Pole?

The South Pole is the point which is closest to the Central Axis of the Sun during the Winter Solstice. It is also part of the Central Axis and does not rotate around the axis itself.

What is the Equator?

The Equator is a cylinder that passes through the Center of the Earth and intersects with the Central Axis at the Center of the Earth at a right angle. It is defined by the following equation.

$$d_{i(NP,x)[a]} = d_{i(SP,x)[a]}$$

The distance between the North Pole and object x at Point in time [a], $d_{i(NP,x)[a]}$, is equal to the distance between the South Pole and object x at Point in Time [a], $d_{i(SP,x)[a]}$.

When is a point located in the Northern Hemisphere?

A point on the surface of the Earth is located in the Northern Hemisphere when the object is closer to the North Pole than to the South Pole. This is described in the following equation

$$d_{i(NP,x)[a]} < d_{i(SP,x)[a]}$$

The distance between the North Pole and an object x at point in time [a], $d_{i(NP,x)[a]}$, is less than the distance between the South Pole and the object at point in time [a], $d_{i(SP,x)[a]}$.

When is a point located in the Southern Hemisphere?

A point on the surface of the Earth is located in the Southern Hemisphere when the object is closer to the South Pole than to the North Pole. This is described in the following equation

$$d_{i(SP,x)[a]} < d_{i(NP,x)[a]}$$

The distance between the South Pole and an object x at point in time [a], $d_{i(SP,x)[a]}$, is less than the distance between the North Pole and the object at point in time [a], $d_{i(NP,x)[a]}$.

What is movement to the north in the Southern Hemisphere?

An object's movement to the north in the southern hemisphere means that the distance between the object and the North Pole decreases over time. The distance between the object and the South Pole increases over time. The distance between the object and the Equator decreases with time. This is described in the following equations:

$$d_{i(SP,x)[a]} < d_{i(SP,x)[a+1]}$$
$$d_{i(NP,x)[a]} > d_{i(NP,x)[a+1]}$$
$$d_{i(EQ,x)[a]} > d_{i(EQ,x)[a+1]}$$

The distance between the South Pole and object x at point in time [a], $d_{i(SP,x)[a]}$, is less than the distance between the South Pole and the object x at point in time [a+1], $d_{i(SP,x)[a+1]}$.

The distance between the North Pole and object x at point in time [a], $d_{i(NP,x)[a]}$, is greater than the distance between the North Pole and the object x at point in time [a+1], $d_{i(NP,x)[a+1]}$.

The distance between the Equator and object x at point in time [a], $d_{i(EQ,x)[a]}$, is greater than the distance between the Equator and the object x at point in time [a+1], $d_{i(EQ,x)[a+1]}$.

What is movement to the north in the Northern Hemisphere?

An object's movement to the north in the Northern Hemisphere means that the distance between the object and the North Pole decreases over time. The distance between the object and the South Pole increases over time. The distance between the object and the Equator increases with time. This is described in the following equations:

$$d_{i(SP,x)[a]} < d_{i(SP,x)[a+1]}$$
$$d_{i(NP,x)[a]} > d_{i(NP,x)[a+1]}$$
$$d_{i(EQ,x)[a]} < d_{i(EQ,x)[a+1]}$$

The distance between the South Pole and object x at point in time [a], $d_{i(SP,x)[a]}$, is less than the distance between the South Pole and the object x at point in time [a+1], $d_{i(SP,x)[a+1]}$.

The distance between the North Pole and object x at point in time [a], $d_{i(NP,x)[a]}$, is greater than the distance between the North Pole and the object x at point in time [a+1], $d_{i(NP,x)[a+1]}$.

The distance between the Equator and object x at point in time [a], $d_{i(EQ,x)[a]}$, is less than the distance between the Equator and the object x at point in time [a+1], $d_{i(EQ,x)[a+1]}$.

What is movement to the South in the Northern Hemisphere?

An object's movement to the south in the Northern Hemisphere means that the distance between the object and the South Pole decreases over time. The distance between the object and the North Pole increases over time. The distance between the object and the Equator decreases with time. This is described in the following equations:

$$d_{i(NP,x)[a]} < d_{i(NP,x)[a+1]}$$
$$d_{i(SP,x)[a]} > d_{i(SP,x)[a+1]}$$
$$d_{i(EQ,x)[a]} > d_{i(EQ,x)[a+1]}$$

The distance between the North Pole and object x at point in time [a], $d_{i(NP,x)[a]}$, is less than the distance between the North Pole and the object x at point in time [a+1], $d_{i(NP,x)[a+1]}$.

The distance between the North Pole and object x at point in time [a], $d_{i(SP,x)[a]}$, is greater than the distance between the North Pole and the object x at point in time [a+1], $d_{i(SP,x)[a+1]}$.

The distance between the Equator and object x at point in time [a], $d_{i(EQ,x)[a]}$, is greater than the distance between the Equator and the object x at point in time [a+1], $d_{i(SP,x)[a+1]}$.

What is movement to the South in the Southern Hemisphere?

An object's movement to the south in the Northern Hemisphere means that the distance between the object and the South Pole decreases over time. The distance between the object and the North Pole increases over time. The distance between the object and the Equator increases with time. This is described in the following equations:

$$d_{i(NP,x)[a]} < d_{i(NP,x)[a+1]}$$
$$d_{i(SP,x)[a]} > d_{i(SP,x)[a+1]}$$
$$d_{i(EQ,x)[a]} < d_{i(EQ,x)[a+1]}$$

The distance between the North Pole and object x at point in time [a], $d_{i(NP,x)[a]}$, is less than the distance between the North Pole and the object x at point in time [a+1], $d_{i(NP,x)[a+1]}$.

The distance between the North Pole and object x at point in time [a], $d_{i(SP,x)[a]}$, is greater than the distance between the North Pole and the object x at point in time [a+1], $d_{i(SP,x)[a+1]}$.

The distance between the Equator and object x at point in time [a], $d_{i(EQ,x)[a]}$, is less than the distance between the Equator and the object x at point in time [a+1], $d_{i(SP,x)[a+1]}$.

Part 2

Push and Pull Forces

Push Forces between Fields

A Push Force is defined as a force that exists between two fields in which one object exerts a force upon another object which causes the distance between two objects to increase in relation to time. It is described in the following equations.

$$F_{(x)[a]} \overset{\text{Push}}{\Rightarrow} F_{(y)[a]}$$
$$d_{i(x,y)[a]} < d_{i(x,y)[a+1]}$$

If a Field of x at point in time [a], $F_{(x)[a]}$, exerts a push force upon Field of y at point in time [a], $F_{(y)[a]}$. Therefore, the distance between Field x and Field y at point in time [a], $d_{i(x,y)[a]}$, is less than the distance between Field x and Field y at point in time [a+1], $d_{i(x,y)[a+1]}$. The distance between Field (x) and Field (y) increases over time.

Pull Forces between Fields

A Pull Force is defined as a force that exists between two fields in which one object exerts a force upon another object which causes the distance between two objects to decrease in relation to time. It is described in the following equations.

$$F_{(x)[a]} \overset{Pull}{\Rightarrow} F_{(y)[a]}$$
$$d_{i(x,y)[a]} > d_{i(x,y)[a+1]}$$

If a Field of x at point in time [a], $F_{(x)[a]}$, exerts a pull force upon Field of y at point in time [a], $F_{(y)[a]}$. Therefore, the distance between Field x and Field y at point in time [a], $d_{i(x,y)[a]}$, is greater than the distance between Field x and Field y at point in time [a+1], $d_{i(x,y)[a+1]}$. The distance between Field (x) and Field (y) decreases over time.

Strong Push Forces between Fields

A strong push force is a force that overpowers a weak pull force. The distance between the two objects will increase in relation to time. This is illustrated in the following equations.

$$F_{(x)[a]} \overset{\text{Push}}{\Rightarrow} F_{(y)[a]}$$
$$F_{(y)[a]} \overset{\text{Pull}}{\Rightarrow} F_{(x)[a]}$$
$$P_{s[a]} > P_{l[a]}$$
$$d_{i(x,y)[a]} < d_{i(x,y)[a+1]}$$

Field of (x) at point in time [a], $F_{(x)[a]}$, exerts a push force against Field of (y) at point in time [a], $F_{(y)[a]}$. Field of (y) at point in time [a], $F_{(y)[a]}$, exerts a pull force against Field of (x) at point in time [a], $F_{(x)[a]}$. If the Push force at point in time [a], $P_{s[a]}$, is greater than the pull force at point in time [a], $P_{l[a]}$ then the distance between Field of (x) and Field (y) at point in time [a], $d_{i(x,y)[a]}$, is less than the distance between Field of (x) and Field of (y) at point in time [a+1], $d_{i(x,y)[a+1]}$. The distance between Field of (x) and Field of (y) increases over time.

Strong Pull Forces between Fields

A strong pull force is a force that overpowers a weak push force. The distance between the two objects will decrease in relation to time. This is illustrated in the following equations.

$$F_{(x)[a]} \overset{\text{Push}}{\Rightarrow} F_{(y)[a]}$$
$$F_{(y)[a]} \overset{\text{Pull}}{\Rightarrow} F_{(x)[a]}$$
$$P_{s[a]} < P_{l[a]}$$
$$d_{i(x,y)[a]} > d_{i(x,y)[a+1]}$$

Field of (x) at point in time [a], $F_{(x)[a]}$, exerts a Push Force against Field of (y) at point in time [a], $F_{(y)[a]}$. Field of (y) at point in time [a], $F_{(y)[a]}$, exerts a Pull Force against Field of (x) at point in time [a], $F_{(x)[a]}$. If the Pull Force at point in time [a], $P_{l[a]}$, is greater than the Push Force at point in time [a], $P_{s[a]}$, then the distance between Field of (x) and Field (y) at point in time [a], $d_{i(x,y)[a]}$, is greater than the distance between Field of (x) and Field of (y) at point in time [a+1], $d_{i(x,y)[a+1]}$. The distance between Field (x) and Field (y) decreases over time.

Equilateral Push and Pull Forces between Fields

Equilateral Forces occur when two objects exert push and full forces upon each other are equal and the distance between them remains equal over time. This concept is also referred to as levitation. This is illustrated in the following equations.

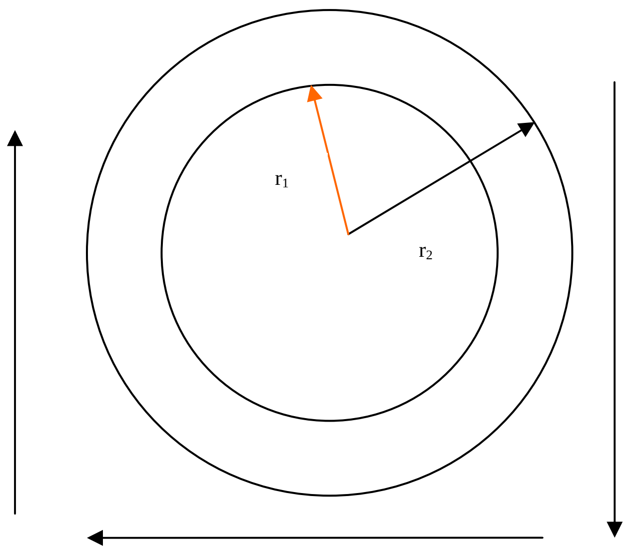
$$F_{(x)[a]} \overset{\text{Push}}{\Rightarrow} F_{(y)[a]}$$
$$F_{(y)[a]} \overset{\text{Pull}}{\Rightarrow} F_{(x)[a]}$$
$$P_{s[a]} = P_{l[a]}$$
$$d_{i(x,y)[a]} = d_{i(x,y)[a+1]}$$

Field of (x) at point in time [a], $F_{(x)[a]}$, exerts a push force against Field of (y) at point in time [a], $F_{(y)[a]}$. Field of (y) at point in time [a], $F_{(y)[a]}$, exerts a pull force against Field of (x) at point in time [a], $F_{(x)[a]}$. If the Push force at point in time [a], $P_{s[a]}$, is equal than the Pull force at point in time [a], $P_{l[a]}$ then the distance between Field of (x) and Field (y) at point in time [a], $d_{i(x,y)[a]}$, is equal to the distance between Field of (x) and Field of (y) at point in time [a+1], $d_{i(x,y)[a+1]}$.

Part 3

Rotational Velocity and Orbital Velocity

The Rotational Velocity of Radius r_2 Is Greater Than the Radius r_1
$r_{2\ \text{and}}$ r_1 Rotate Clockwise at x degrees per minute



The rotational velocity of a radius that rotates around a center of a circle or cylinder is described by the following equation:

$$V_{rot(r_1)} = \frac{2\pi r_1}{t_{rot}}$$

The Rotational Velocity of Radius 1 at point in time [a], $V_{rot(r1)[a]}$, is equal to 2π times the radius r_1 divided by the time of total rotation, t_{rot}.

If r_2**,** is greater than r_1 and if they rotate at the same number of degrees per unit time, then the following equations are true.

$$V_{rot(r_1)} = \frac{2\pi r_1}{t_{rot1}}$$
$$V_{rot(r_2)} = \frac{2\pi r_2}{t_{rot2}}$$
$$\text{if } t_{rot1} = t_{rot2}$$
$$\text{and } r_1 < r_2$$
$$\text{then } \frac{2\pi r_1}{t_{rot1}} < \frac{2\pi r_2}{t_{rot2}}$$
$$\text{and } V_{rot(r_1)} < V_{rot(r_2)}$$

Although r_2 and r_1 may be traveling at the same degrees per second, the rotational velocity of r_1 is less than the rotational velocity of r_2. Thus, the rotational velocity of a radius which is longer than another radius will cover a greater distance and area in the same amount of time per rotation.

Orbital Velocity sees the Earth's Central Axis as the center of rotation for a moving object within the Earth's gravitational field. The object can be stationary at a certain point at sea level. The following may be true for the Orbital Velocity of Objects.

An increase in altitude increases the object's orbital velocity by increasing its radial distance from the Central Axis.

Moving southward in the Northern Hemisphere will increase an object's Orbital Velocity by increasing its radial distance from the Central Axis.

Moving northward in the Southern Hemisphere will increase an object's Orbital Velocity by increasing its radial distance from the Central Axis.

Moving northward in the Northern Hemisphere will decrease an object's orbital velocity by decreasing its radial distance from the Central Axis.

Moving southward in the Southern Hemisphere will decrease an object's orbital velocity by decreasing its radial distance from the central axis.

A decrease in altitude will also decrease an object's orbital velocity.

All objects within the Earth's gravitational field orbit and rotate around the Central Axis. Computer models may be developed to determine the exact distance that an object travels per rotation around Central Axis.

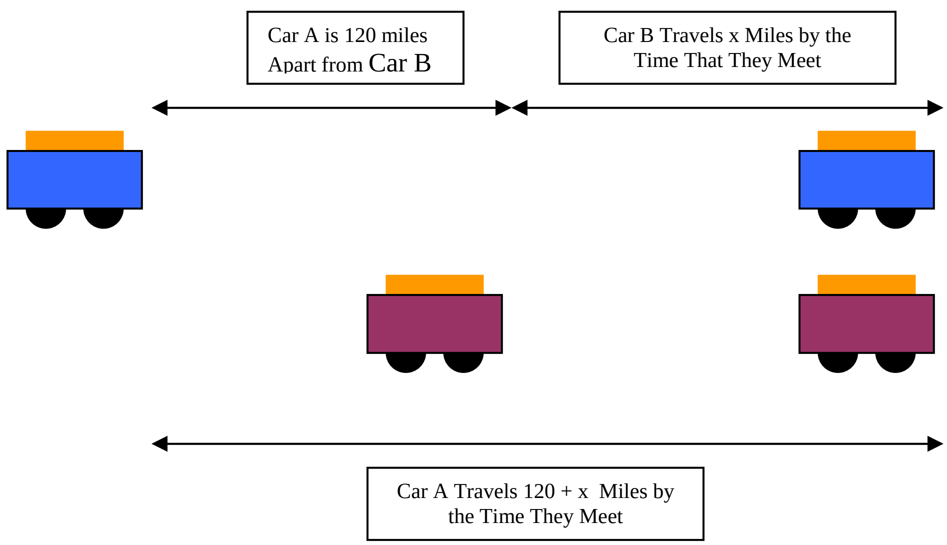
Part 4

The Gravitational Drag Effect

Two objects can drift toward each other in different ways. They always, however, always revolve around something on their journey to meet each other. One type of journey is when one object "catches up" to another object when they are traveling in the same direction. The other type of journey is when they travel toward each other at different speeds. This final section of this paper examines this type of drag effect.

Two cars travel toward each other on the same road. They both move in the same direction. They are initially 120 miles apart. Car A is traveling at 60 miles per hour. Car B is traveling at 40 miles per hour. How long will it take for Car A and Car B to meet? How far will Car A travel before they meet? How far will Car B travel before they meet?

In order to solve this problem, we should look at this illustration.



Let x = Distance that Car B will travel
Let x + 120 = Distance that Car A will travel

The following is a variation of the distance formula.

$$vt = d$$
$$t = \frac{d}{v}$$

If velocity multiplied by time equals distance, then time is equal to the distance divided by velocity.

Since the time it takes Car A to meet Car B is equal for both objects, then we can see the following equations.

$$t_{CarA} = \frac{x\text{ miles} + 120\text{ miles}}{60\text{miles/hour}}$$

$$t_{CarB} = \frac{x\text{ miles}}{40\text{ miles/hour}}$$
$$t_{CarA} = t_{CarB}$$

We can then equate the time it takes for Car A to meet Car B.

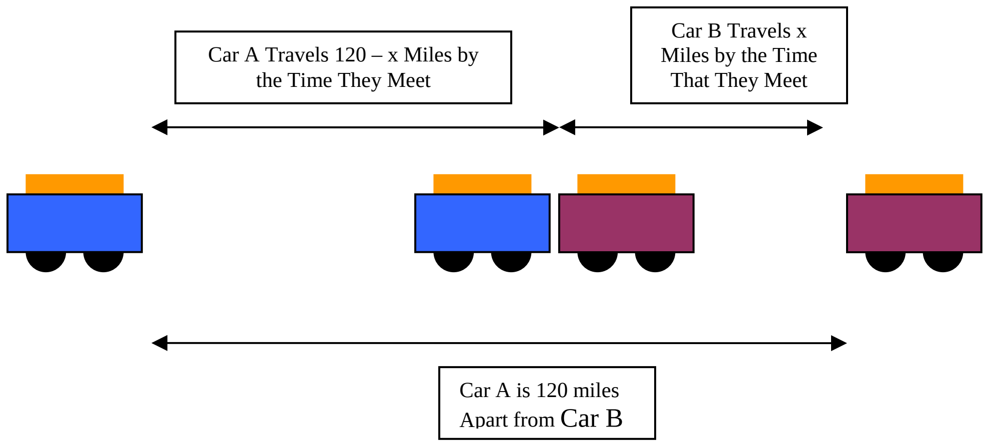
$$\frac{x\text{ mi}}{40\text{ mi/hour}} = \frac{x\text{ mi} + 120\text{ mi}}{60\text{mi/hour}}$$

$$60x = 40x + 4800$$
$$20x = 4800$$
$$x = 240\text{ miles = distance Car B travels}$$
$$\text{x + 120 = 360 miles = distance Car A travels}$$
$$\text{time Car B = }\frac{240\text{ mi}}{40\text{ mi/hour}} = 6\text{ hours}$$
$$\text{time Car A = }\frac{360\text{ mi}}{60\text{ mi/hour}} = 6\text{ hours}$$

Car A and Car B meet after 6 hours. Car A travels 360 miles while Car B travels 240 miles before they meet.

Two cars travel toward each other on the same road. They both move in the opposite directions. They are initially 120 miles apart. Car A is traveling at 60 miles per hour. Car B is traveling at 40 miles per hour. How long will it take for Car A and Car B to meet? How far will Car A travel before they meet? How far will Car B travel before they meet?

In order to solve this problem, we should look at this illustration.



Let x = distance Car B travels
Let 120 - x = distance Car A travels
Car A travels at 60 miles per hour
Car B travels at 40 miles per hour

$$t_{CarA} = \frac{120 \text{ mi - } x \text{ mi}}{60\text{mi/hour}}$$

$$t_{CarB} = \frac{x \text{ miles}}{40 \text{ miles/hour}}$$

$$t_{CarA} = t_{CarB}$$

$$\frac{x \text{ miles}}{40 \text{ miles/hour}} = \frac{120 \text{ mi - } x \text{ mi}}{60\text{mi/hour}}$$

$60x = 4800 - 40x$
$100x = 4800$
$x = 48$ miles is the distance that Car B travels
$120 - x = 72$ miles is the distance that Car A travels
$t_{CarB} = \dfrac{72 \text{ mi}}{60 \text{ mi/hr}} = 1.2$ hours or 1 hour and 12 minutes
$t_{CarA} = \dfrac{48 \text{ mi}}{40 \text{ mi/hr}} = 1.2$ hours or 1 hour and 12 minutes

Car A travels 72 miles before it meets Car B. Car B travels 48 miles before it meets Car A. They meet after 1.2 hours or 1 hour and 12 minutes.

Conclusion

Gravitation has eluded scientists for centuries. Physicists can work with other scientists and engineers to break new ground in the eternal quest of understanding gravitation. Scientists should urge lawmakers in Washington, DC, to provide adequate funding for gravitational research projects. These projects can invigorate our space program. New vehicles could be built that would travel farther, faster and higher than anything that we have seen. We should always pray for a safe space program. We hope that the future will bring new understandings of the universe that will benefit the entire human race.