

Time damping theory

A method of calculating satellite time dilation.

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Abstract

Time damping refers to the effect that matter is damped in the gravitational field, resulting in the slow time velocity of matter.

Any matter cutting the gravitational field will produce time damping, which will slow down the time of the object. Microscopically speaking, the movement period or frequency of various particles becomes slower and the displacement becomes smaller, similar to the damping effect produced when a strong magnet approaches a conductor; The gravitational field has a direction and flows in the direction of gravitation. Objects on the ground of the earth will be passively cut by gravitation and cause time damping. This is consistent with the effect of slowing time caused by the gravitation of general relativity. In addition, when objects are moving at high speeds, they will also cause time damping. Changes in cutting effects, such as satellites cutting the gravitational field at a faster speed, are consistent with the clock delay of special relativity.

The above "cutting" explanation: refers to any movement relative to the gravitational field (the gravitational field itself is also flowing).

The word "cutting" comes from "cutting magnetic lines of induction". After the gravitational field and electromagnetic field are unified, it may be possible to use "cutting".

Attachment: What is time? Time is the change of matter (frequency, displacement, etc.) and human perception (aging, heartbeat, etc.).

The speed of time passing is linked to the speed of light, which is why the speed of light does not change!

Time flow rate: the speed (rate) of time passing.

The speed of light is the flow of time.

Since the strength of the gravitational field has a lower limit, the time flow rate has an upper limit.

That is, the time flow rate can decelerate indefinitely, but it cannot accelerate indefinitely.

Similar to the "absolute 0 degree" of temperature, the time flow rate has a maximum value.

Time damping theory does not discuss: qualitative increase and scale reduction, thinking that the two are just mathematical games without derivation and explanation.

Time damping is not absolute, and time damping is also relativity. Discuss the difference between the time velocities of two objects.

Time damping is not damping to reduce energy.

The meaning of the gravitational field is not the same as the existing "gravitational field". I suggest you change the name to "flat gravitational field".

Formula source:

I want to add an unknown parameter k to the special relativity formula to realize the effect of gravity on time.

Extended special relativity expression:

$$(ct)^2 = (ct')^2 + (|\vec{v} + k\vec{c}|t)^2$$

When the gravitational field strength is 0, $k = 0$; and

$$|\vec{v} + k\vec{c}| < c$$

Maybe, $k = 1$ at the event horizon of the black hole.

The purpose is to add gravitational parameters to the formula of special relativity.

How to deduce the expression of k ?

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Because the Schwarzschild radius is calculated by the escape velocity, it is speculated that the gravitational field velocity may be the escape velocity:

$$(ct)^2 = (ct')^2 + \left(|\vec{v} + \sqrt{\frac{2GM}{R}} \right|^2 t^2$$

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The calculation requires the relative velocity component of the gravitational field of the satellite, so it is opposite to the velocity of the gravitational field, so:

$$(c\Delta t)^2 = (c\Delta t')^2 + \left(|\vec{v} - \sqrt{\frac{2GM}{R}} \right|^2 (\Delta t)^2$$

$\sqrt{\frac{2GM}{R}}$ is escape velocity.

R is the distance from the object to the center of the earth.

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$$\sqrt{\frac{2GM}{R}}$$

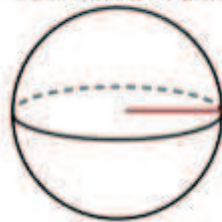
Gravitational field velocity vector:

R is the distance from the satellite to the center of mass of the earth.

The Schwarzschild radius is calculated by the escape velocity. The time flow velocity at the Schwarzschild radius is close to 0, and the ground escape velocity is about 11.2 km/s, that is, the gravitational field travels at a speed of about 11.2 km/s. Through your body.

The high-speed gravitational field passing through your body will cause you to produce time damping, resulting in a slower flow rate of your body. The larger the gravitational field, the more obvious this effect will be.

球的表面积: $S_{球} = 4\pi R^2$



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The surface area formula of the ball:

$$v = \sqrt{\frac{2GM}{R}}$$

Escape speed:

The surface area and radius of the sphere are in a square relationship, and the escape velocity and radius are also in a square relationship.

It shows that the gravitational field is evenly distributed and there is no bending space.

If it is uniform, there should be a conclusion that the product of the surface area and the strength of the gravitational field is constant.

$$S = 4\pi R^2$$

$$g = \frac{GM}{R^2}$$

$$Sg = 4\pi GM$$

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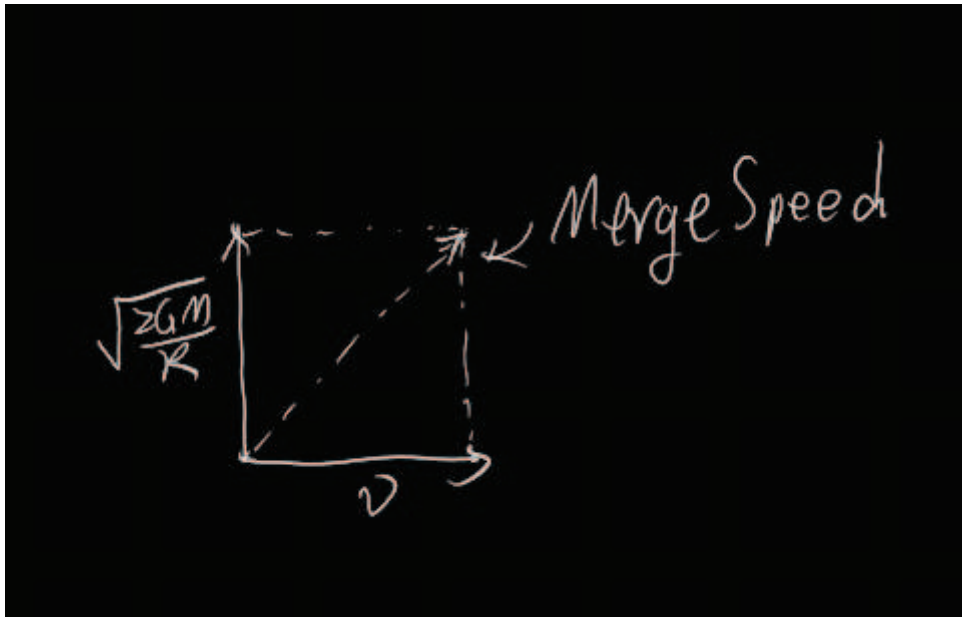
It is indeed a constant.

May I ask if the rain falls vertically, people standing still and people running back and forth, and finally return to the original point, which rain is more frequent?

Usually, the more you run, the more rain. In the same way, when you run in the gravitational field force, it will cause the amount of gravitational field to increase, which will cause you to produce more time damping, and cause your time to expand. This is the delay of the moving clock.

Of course, if he runs to a far place to avoid rain (the gravitational field is small), and then runs back, because his time flow is relatively fast during the period of avoiding rain, so whoever runs back has the fast time and who has the slow time, and There is no conclusion.

The flow direction of the gravitational field is perpendicular to the movement direction of the satellite, so use the Pythagorean theorem to calculate the equivalent speed:



Use the formula to calculate(python code):

```
import math

G = 6.67 * 10 ** -11
M = 5.965 * 10 ** 24
c = 299792458
pi = math.pi

# The distance from the ground to the center of the earth
R = (6371 + 0) * 1000

# Linear velocity of the earth's surface, Latitude 23.5°
vl = math.cos(23.5 * pi / 180) * R * 2 * pi / (3600 * 24)

# Field velocity. Surface escape velocity.
vc = math.sqrt(2 * G * M / R)

# Merge speed
vh = math.sqrt(vl ** 2 + vc ** 2)

tp = math.sqrt(1 - vh ** 2 / c ** 2)
# Swelling microseconds per day, 1 μs equal 10-6 s
x0 = (1 - tp) * 3600 * 24 * 1000 * 1000
print("x1 Microseconds of ground expansion per day:", x0)
x1 = x0
```

```

# *-----
# Height + radius of the earth
h = 20200 # GPS satellite orbit altitude
R = (6371 + h) * 1000
# GPS satellite linear velocity
v1 = math.sqrt(G * M / R)
# GPS satellite field velocity
vc = math.sqrt(2 * G * M / R)
# Merge speed
vh = math.sqrt(v1 ** 2 + vc ** 2)
tp = math.sqrt(1 - vh ** 2 / c ** 2)
# Swelling microseconds per day, 1 μs equal 10-6 s
x0 = (1 - tp) * 3600 * 24 * 1000 * 1000
print("x2 Microseconds of satellite expansion per day:", x0)
x2 = x0
print("x1 - x2: ", x1 - x2, " <===== Microsecond expansion of
satellite relative to ground")

```

result:

x1 Microseconds of ground expansion per day: 60.121290346160094

x2 Microseconds of satellite expansion per day: 21.591953824895427

x1 - x2: 38.52933652126467 <===== Microsecond expansion of satellite relative to ground

Wow, 38.5 microseconds!

Comply with the time dilation of GPS satellites!

The escape speed is suspected to be the speed at which the gravitational field cuts you!

Why is the escape velocity? This requires careful consideration of the philosophical issue of escape speed!

Thinking about the philosophical issue of escape velocity may be able to understand the rationality of using escape velocity.

I took an absolute time: infinity!

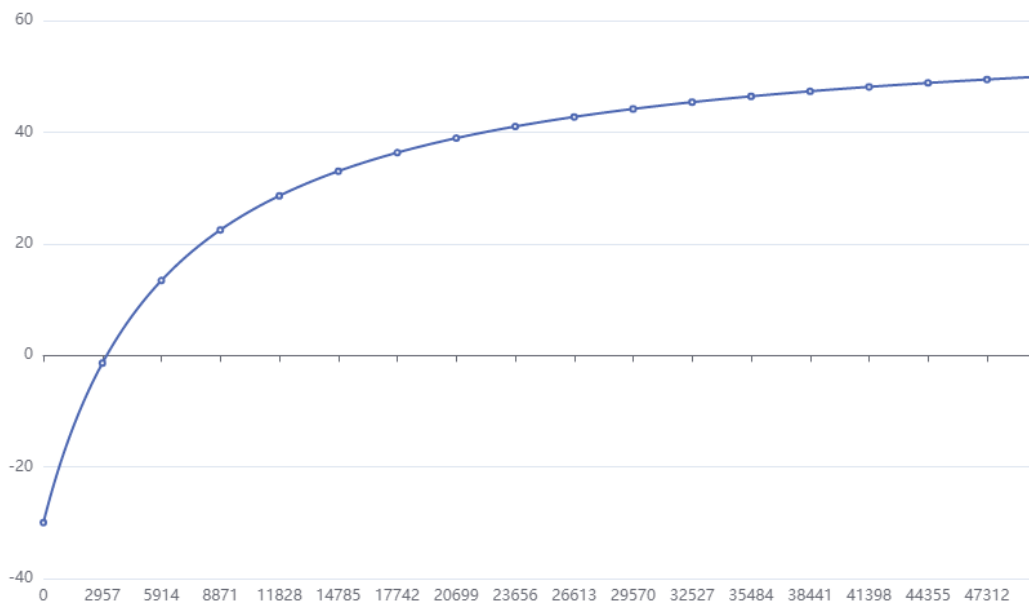
Modifying the above parameters can be calculated: Beidou time dilation is about 39.5 microseconds every day.

Modifying the above parameters can be calculated: when the satellite orbit height is about 3171.7km (radius is about 8542.7km), the clock frequencies of the ground and the satellite are almost the same.

Modifying the above parameters can be calculated: the synchronous satellite expands by about 46.5 microseconds every day.

Calculate the time dilation value of each height and plot it:

Relationship between satellite altitude (m) and daily time expansion value (microseconds)



Thank you for reading!