Mathematical form space: a new understanding of space in the theory of relativity

[Short Title] Mathematical Form Space in the Theory of Relativity

Abstract

What is the nature of space? The theory of relativity does not clarify the problem. The negative effect of the mathematical formal system of the theory and its distinguishing method have not been reported. This negative effect is mainly the proliferation of mathematical formal concepts (and/or conclusions) that violate mathematical logic and are inconsistent with facts. Through a series of thought experiments (that is, mathematical logic analysis), it reveals the spatial paradox related to concept proliferation that have never been reported in the special theory of relativity. "Space shrinks due to movement, and this shrinkage is relative" can lead to contradictions in mathematical logic, so it is a typical mathematical formal conclusion, and the space in the theory of relativity can only be the space of mathematical form. Proving the existence of space problems also proves the existence of the above-mentioned negative effects. The practicality of the theory of relativity determines the problem of the theory of relativity which we have to tolerate.

Keywords: mathematical formal system of physics theory; concept proliferation; mathematical formal concept; spatial paradox; negative effect of mathematical formal system.

Introduction

Everyone says that the theory of relativity brings humans' understanding of time and space to a higher level (from Newton's absolute space-time view to Einstein's relative space-time view). Einstein's theory describes the variable characteristic of time and space. It does not properly expose the essence of time and space. Is the time and space related to the mathematical space described by x, y, z in the mathematical equation, or is it the volume of a moving object? Until now, this issue is still confusing. Many people pointed out some problems in the theory of relativity, and many of them strongly protested the problems in the theory of relativity [1-5]. It can be said that the problem of relativity (especially the spatial paradox) is still not treated correctly. Most of these people did not realize the transitional and long-term nature of theoretical development (during the transitional period of theoretical development, part of the content of the mathematical formal system that allows the theory to be inconsistent with the facts). Mankind's understanding of time and space will certainly continue to deepen. This article will explore the essence of space-time view in the framework of special relativity. At the same time, it discusses the shortcomings of the time-space view of the theory of relativity, and demonstrates why we should tolerate these shortcomings. It is concluded that the space in the special theory of relativity is a mathematical formal space. As long as it is admitted that Einstein's understanding of time and space is an improvement, it must be admitted that this article is also an improvement in the understanding of time and space. The mistake people make is to regard the mathematical form space required by the mathematical formal system as a real space consistent with facts.

The mathematical formal system itself can derive some concepts. There is no perfect person in the world. We cannot reject or even execute a person because of his shortcomings. Theories are the same as people, and there is no perfect theory (otherwise, the theory will develop to the end and cannot continue to develop). Only the ultimate theory has no shortcomings and does not need development. But the ultimate theory does not exist. As long as any theory has practical value, we should tolerate its shortcomings. In order to ensure the integrity and logical rigor of the physics theory system, it is generally necessary to establish a rigorous mathematical formal system for the physics theory. The mathematical formal system of the theory itself can derive some concepts. Hilbert space and Minkowski four-dimensional space are both typical concepts in mathematical form. The concept of mathematical form that can directly or indirectly derive results consistent with facts is a concept of beautiful mathematical form. The rigor of the mathematical formal system of the theory is not always consistent with the conformity between the theory and the facts. In the imperfect theoretical system of physics, there are always some mathematical concepts (or mathematical conclusions) that are inconsistent or untrue. We call such mathematical formal concepts or conclusions ugly mathematical formal concepts (or conclusions). Concepts or conclusions in mathematical forms that are inconsistent with facts or can lead to logical contradictions must be ugly mathematical concepts or conclusions (the basic premise of the theory is obviously also the premise or part of the mathematical formal system of the theory). We can determine which concepts or conclusions are ugly mathematical formal concepts and/or ugly mathematical formal conclusions by looking for mathematical and logical contradictions in the theory. We sometimes replace the "ugly" word with "failed" or simply omit them. We can call the forming process of the ugly mathematical form concept “concept proliferation”.

As mentioned earlier, the theory of relativity has a strict mathematical formal system, but this does not guarantee that the theory of relativity does not deviate from the actual shortcomings (not to mention that it does not have mathematical logical contradictions). The theory of relativity is superior to the previous similar theories, and the theory that replaces the theory of relativity has not yet appeared (or has appeared, but has not yet been recognized [6-9]). Since the theory of relativity still has practical value, we have to temporarily tolerate some of its shortcomings. There are many people who criticize the theory of relativity (including the view of time and space in the theory of relativity). They pointed out many contradictions in the theory of relativity. One category of people does not admit that there are contradictions in the theory of relativity. Another type of people totally deny the theory of relativity because of the contradictions in the theory of relativity. The former is obviously paranoid because of emotions, interests, or beliefs. The latter is a perfectionist.

The core of the mathematical formal system of special relativity is the Lorentz transformation (or Minkowski's four-dimensional space geometry). The core of the mathematical formal system of general relativity is Einstein's field equations. "Space shrinks due to movement", "The result of each other’s observation is the contraction of the observed party's ruler", "simultaneous relativity", and "space bends due to mass" are the conclusions derived from the mathematical formal system of the theory of relativity. We will judge whether the conclusions of these two special relativity are ugly mathematical conclusions by examining the first two conclusions. As long as the conclusion that "space shrinks due to movement and this shrinkage is relative" can lead to mathematical logic contradictions (or inconsistent with the facts), it is the space difficulty of special relativity. There are countless people who point out the contradictions in the theory of relativity, so that orthodox physicists suffer from serious "aesthetic fatigue." Space difficulty is a new contradiction in the special theory of relativity. Revealing it can arouse readers' interest and increase readers' knowledge (improve readers' awareness of space).

Fighting and walking on the roof of the car are exactly the same as the movement in the car, and the mathematical form of the laws of mechanics is exactly the same. This is the foundation of Galileo's principle of relativity and Einstein's principle of relativity. The space of the inertial system of a train moving at a constant speed is not limited to the compartment (note: space refers to vacuum). A certain distance around the car is also its spatial range. The theory of relativity does not provide a method to divide the space boundary of the motion system. Therefore, this spatial range can only be infinite. If the space of the motion system is limited, there must be a way to divide this space boundary. This is the concept of space belonging and space scope of Galileo's principle of relativity and Einstein's principle of relativity. Adhering to this concept is equivalent to admitting that "the movement of a small object is accompanied by an infinite space that moves with it." However, there is no reliable physical mechanism for a small object to move an infinite space with it. This view of spatial belonging is just a choice in the sense of mathematics. However, some correct conclusions can be drawn based on this view of spatial belonging and spatial scope (Note: Not all derived conclusions are correct. This shows that the scope of application of the theory of relativity is limited). In other words, not all ugly mathematical concepts are unavailable.

The motion in the special theory of relativity refers to the relative motion between frames of reference. Described in mathematical language, the reference system is the coordinate system. The mathematical form space in special relativity is the collection of points in the coordinate system. The range of the space coordinate system is infinite. It can be seen that the space described by the mathematical formal system of special relativity is a system composed of an infinite number of points arranged infinitely in three mutually perpendicular directions, and its range is infinite. There are several difficulties in the relative movement of two infinite spaces: first, there is no place for them to move in the infinite space; second, there is no mechanism for two infinite spaces to intersect each other. For the special theory of relativity, in the space connected with the moving object, the movement of the point outside the object can only be a mathematical motion.

There are logical problems with the movement of empty space and the movement of infinite space. (The movement of space without a thing belongs to the movement of nothing. There is no gap for infinite space to move, and infinite space can only be absolutely static). The absolute motion of infinite objects (including infinite space) has no meaning. In the space-time view of relativity (especially the concept of space range), there are countless overlapping infinite spaces in the universe, and there are relative motions between these infinite spaces. (Each motion system corresponds to an infinite space, and these infinite spaces move in a staggered manner). Logically, there can only be one infinite space in the universe. It can be seen that there are also logical problems in the relative movement between infinite spaces. There are also logical problems in the division method of space attribution in the theory of relativity. If the space that can be driven by a moving object is a limited space, this small space for movement is moving in space. The "movement of space" in the theory of relativity refers to "movement of one space in another space". The concept of "small space moving in large space" also has problems of logic and authenticity. In addition, the theory of relativity cannot provide a method of manufacturing spatial motion. If it is admitted that objects are embedded in space, accelerating objects is not a way to create spatial motion.

If "let the still space move and let the space of motion rest" cannot be done, what else can we talk about in practice utilizing the space contraction characteristic due to motion? If the relative motion of space is derived from the movement of the observer, then all the moving spaces are the same infinite space. We cannot determine the contraction center of infinite space contracted by motion. As mentioned above, it is recognized that the space to which the motion system belongs is infinite, and there is a problem of "no gap for infinite space displacement"; Acknowledging that the movement system only occupies a small space, there is the problem of "a small space moves in a large space, that is, space moves in a space". If the space really shrinks due to movement, the center of shrinkage of the infinite space cannot be determined (It's definitely not the midpoint of the object that drives infinite space to move). It can be seen that the concepts and inferences in the theory of relativity — "space movement" or "space shrinks due to movement" — have insurmountable logical problems. What has been revealed above is the difficulty of spatial movement in the theory of relativity.

In nature and production practice, the motion of the inertial system is obtained through acceleration, and there are no objects and systems that are always in a state of uniform linear motion. If the space contraction center of the accelerated motion system is not discussed, the application of the special theory of relativity will be restricted and the theory will be incomplete.

Here are a few thought experiments to illustrate the existence of space paradox (belonging to the category of logical problems or logical contradictions) that people rarely think of in the special theory of relativity, and to prove that the space in the special theory of relativity is an ugly mathematical form of space. The reasons why we tolerate the existence of these contradictions are: The mathematical formal system of the special theory of relativity is neither all right nor all wrong; A better alternative theory has not appeared, and the special theory of relativity still has practical value.

1. Observe the accelerating wheel train in the inertial system

There is a straight line on a roadbed system. There are two separate four-wheel drive locomotives on the railway. The length of each locomotive is 16 meters, the distance between the front and rear wheels is 8 meters, and the distance between the two locomotives is 40 meters, The minimum distance between two wagons. That is, the gap between the two locomotives, is 24 meters. The ratio of this gap to the length of the locomotive is 24:16=3:2. This is the situation when the locomotive is stationary in the roadbed system. The two locomotives start at the same time, and at the same time they reach the same uniform linear motion state from a static state, and the final speed is 0.866c , And then keep this speed forward (the acceleration and speed of the eight wheels in the two locomotives are always exactly the same). If it is true that the space (or ruler) shrinks due to movement, then the carriages will continue to shrink during the acceleration of the two locomotives.

In this example, the train is continuously accelerating, and the train should be continuously contracting. The continuous shrinkage of the train involves the center of shrinkage (or shrinking direction). Because the process of space contraction is the same as the process of object contraction, which is composed of countless points of movement, and the movement of points must have a direction of movement. Space contraction must clarify the center of contraction (or the direction of contraction, that is, the direction of contraction movement of the space point). In a system that continues to accelerate, time also continues to accelerate expansion. But the continuous expansion of time does not have the problem of the center of time expansion (Time is an amount of intensity. Time dilation is not constituted by the movement of points). In this example, the two locomotives have independent power (only the acceleration and the acceleration starting point and the acceleration direction are the same. Someone might not hesitate to say that the bodies of the two accelerating trains shrink toward their respective centers (Similar to the situation in

Figure 1b: the space between the two locomotives belongs to the roadbed system. The same system has multiple shrinkage centers). This is a hasty conclusion. Because these two locomotives are always connected to the same system, they contraction due to movement can only have one center of contraction, and the center distance between them will change due to the shrinkage of the system. This is the problem brought about by narrow relativity.

According to classical physics, the distance traveled by these two locomotives with independent power systems are all $0.5at^2$, and the distance between them should always remain the same. They are associated with the same acceleration system (when acceleration is stopped, they are associated with the same inertial system). Considering this connection, the contraction pattern of the two locomotives in this example is similar to that in **Figure 1c**, that is, the gap between the two locomotives belongs to the train system and the two locomotives share a contraction center. Unfortunately, there is no such thing as space contracting by movement in this classical conclusion (the center distance between two locomotives does not change with their accelerated motion) . For uniformly accelerated motion, S=0.5at2 is not questionable, and the conclusion of narrow relativity is questionable.

The inference that "space shrinks due to movement" has its own logic problems. Because empty space impossible complete the behavior of "movement" (movement without matter equals no movement). The statement that "space is full of field matter or space is full of virtual particle pairs" can only mean that space is occupied by field matter, but not that space is the field matter (or virtual particles) themselves. In other words, the movement of field matter in space does not represent space movement. Even if space is considered to be a special matter, infinite space matter can only exist independently and can only be absolutely static. The movement of ordinary matter in infinite space cannot carry such overall movement and partial movement of the infinite space. In other words, in fact, the space occupied by a moving object is not the space of the system corresponding to the moving object (At most, it can only theoretically assume that the space occupied or enclosed by an object is the space of the system related to the object under certain specific occasions). This is different from the view of space belonging in the theory of relativity (The theory of relativity believes that the movement of space moves with the matter embedded in the space. This article believes that the movement of matter in space is the change of the position of the space occupied by the matter). It can be seen that the question of relative movement of space is also a question of space attribution. If space contraction is a visual effect, then time expansion can only be a visual effect (Time dilation cannot be accumulated). Because, it can be said that "space contraction, time expansion, and simultaneous relativity" are all derived results of the Lorentz transformation.

It is obvious and easy to see, using the principle of relativity, there are some contradictions in the above situation.

Second, we now replace the two four-wheel locomotives mentioned above with eight self-powered unicycles. They are listed as a team on the monorail, and the distance between adjacent wheelbarrows is 50 meters. The distance between the center of the front wheelbarrow and the last wheelbarrow is 350 meters. Other conditions remain unchanged (See **Figure 1a**). Observed in the roadbed system, this wheelbarrow has the following shrinkage methods to choose from: First, the wheels shrink while the length of the queue does not change; second, the wheels and the length of the queue shrink in the same proportion. Observing in the roadbed system, the distance traveled by this team of wheelbarrows and each on the roadbed during acceleration is the definite integral of the product of translational acceleration and t over time ($0.5at^2$). This distance is also equal to the product of the number of turns of the wheel, the diameter of the wheel, and π. The result of this calculation that is most in line with the real situation is obviously the first case above (The length of the queue and the center distance between adjacent wheels in this team of wheelbarrows is always the same. See **Figure 1b)**. However, when we connect the team of wheelbarrows with a thin wire (the connection point is at the center of the wheel, and this thin line is too fragile to affect the operation of each wheel), according to the theory of relativity, the team of wheelbarrows becomes a whole (belonging to the same system). After the acceleration is over, the distance between adjacent wheelbarrows will definitely be reduced to half of the original, and the distance between the front wheel and the last wheel will shrink to 175 meters (That is the second case above. See **Figure 1c**). The function of this thin thread is in line with theory but divorced from reality It must cause the wheels to slip on the rails. In theory, it changes the space ownership between cars — Once a thin line is tied between the car and the car, the gap between the car and the car is separated from the roadbed system and belongs to the unicycle system. This is impossible).

After the acceleration of this team of wheelbarrows is over, is the distance between the center of the first wheelbarrow and the last wheelbarrow 350 meters or 175 meters? The inferred result of the theory of relativity is 175 meters, but it violates the objectivity, authenticity and reality of "the rolling distance of mutually independent wheels is equal to the product of the number of turns, the diameter of the wheel, and π". Because of this conclusion, it must be admitted that during the acceleration of the train fleet, the shrinkage of space has a strong force to drag the wheelbarrow closer to the center (the total distance between the front and rear wheels sliding on the rail is 175 meters). The wheels need to overcome friction when sliding on the rails. If there is no space contraction force, the friction force between the wheelbarrow and the rail cannot be overcome and slip. Relativity cannot give this kind of space contraction force (it can't find its source and physical mechanism, so it can only deny its existence. But in reality, the existence of this force is needed). The idea that space contraction causes the objects embedded in it to contract without requiring force is obviously a purely theoretical conjecture, and contradicts the principle of relativity that "the laws of physics in different inertial systems are in exactly the same form". See the example of continuous shrinkage of hexahedral ionic compound due to movement (The law of electromagnetic interaction between point charges is different in the vertical and horizontal directions). Originally, only talking about the result of change without talking about the physical mechanism of change is one of the Achilles' heels of the theory of relativity. In this example, the weakness is most prominent. Someone must say that when the space shrinks, the objects embedded in the space will shrink without additional compressive force or attractive force. But this will directly negate the objective law of "when the object shrinks, the force between the particles in it also changes." The electric charge of the particles in the moving object does not change. In the hexahedral ionic compound, the distance between two adjacent ions in the longitudinal direction is shortened, and the distance between the ions in the transverse direction remains unchanged. At this time, if the interaction of ions in the lateral direction conforms to Coulomb's law, then the interaction of ions in the longitudinal direction does not conform to Coulomb's law. Vice versa. The theory that leads to the applicability of Coulomb's Law in relation to direction must be problematic.

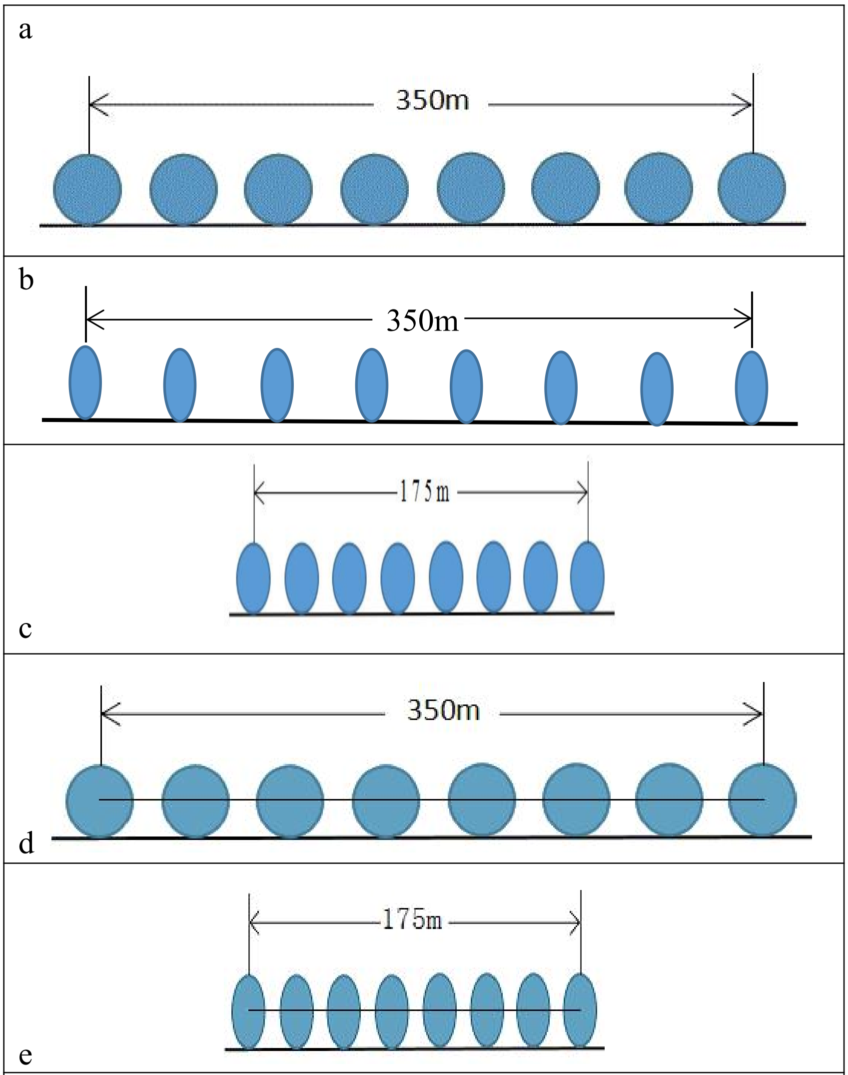

Figure 1. A team of wheelbarrows accelerates from a standstill. (a) Stationary wheelbarrow queue. (b) Each wheelbarrow shrinks due to acceleration, but the length of the queue does not change. (c) The wheelbarrow queue as a whole shrinks due to movement. (d) The stationary state of eight wheelbarrows connected by thin lines. (e) The state of the eight wheelbarrows connected by thin lines after the entire contraction due to movement.

Now, we use a thin wire to connect the above 8 wheelbarrows, the connection point is on the axle (**Figure 1d**), and other conditions remain unchanged. At this point, according to the special theory of relativity, it can be said with certainty that the shrinkage of this team of wheelbarrows is that the length of the wheels and the queue shrink at the same time (**Figure 1e**). If there is no shrinking force that causes the wheels to slide on the rails, conditions c and e will not appear (still observed in the roadbed system). This force must be provided by the so-called fragile thread. If the tension that the thin line can withstand is very small, what will happen (will the contraction of the fleet length deviate from the prediction of the theory of relativity)? In other words, if situation e must occur, it must be admitted that space contraction due to movement requires contractile force (or contractile force exists). This is in contradiction with the principle of relativity (the existence of the space contraction force corresponding to the frictional force mentioned here is absolute). If there are passengers on the wheelbarrow shown in **Figure 1d**, they can observe and have an overall knowledge of what they have observed (otherwise, general relativity has no application value). If you observe on the wheelbarrow shown in **Figure 1d**, the connecting line should play a role in supporting the team. For adding a fragile connecting line, its actual effect will never be great, but its theoretical effect is very great. This indicates that relativity differs greatly from reality (before the fine lines are added, this unicycle has multiple shrink centers, and after the fine lines are added, this unicycle has only one shrink center...), making people have to doubt the correctness of relativity.

This case revealed a central difficulty with spatial shrinkage in the setting of spatial shrinkage difficulty.

2. Observe the umbrella rotating at high speed

"In the same system, the movement distance of a point = the product of the movement speed of a point and its movement time" is a mathematical law. The credibility of this law is higher than that of the special principle of relativity.

An umbrella is spinning at high speed (Assuming that this umbrella is a standard plane after it is opened) . According to the special theory of relativity, the bell shrinks slowly, the edge of the umbrella shrinks, and the relationship between the umbrella diameter and the circumference does not conform to the law of π (That is, the circumference deviates from the product of diameter and π). If we only consider the trajectory of the end of the rib of such an umbrella, the relationship between the length of this trajectory and the length of the rib must conform to the law of circumference (Circumference is equal to the product of diameter and π). The conclusion based on the point's trajectory contradicts the conclusion based on the theory of relativity. What happens if the canopy falls off during high-speed rotation and the ribs remain? According to the theory of relativity, this question cannot be answered accurately. The reasons are as follows: at this time, the circumference of the circle drawn by each point must be calculated according to the motion trajectory of each point on the umbrella plane; The circumference of a circle drawn in a relatively static space will not shrink relativistically; The umbrella surface and the surfaces spliced by these circular trajectories must overlap (because these circles are drawn by the points of the umbrella surface); As long as the circumference of these circles does not shrink, the umbrella surface does not shrink.

For a circular plane, when the degree of shrinkage of the area with a large radius is higher than the degree of shrinkage of the square with a small radius, the plane will inevitably be deformed or cracked. If neither deformation nor cracking is observed, the contraction can only be a purely theoretical prediction, not even the apparent visual effect.

This example reveals the difficulty of non-uniform shrinkage in the difficulty of space shrinkage.

3. Observe that objects falling into the pit expand due to deceleration

There is a 4.2-meter-long pit on the ground and a metal plate with a static length of 8 meters in the air. The board falls diagonally into this pit at a very high speed (the lateral velocity component is 0.866c. See **Figure 2** for details). According to the inference of the theory of relativity, the length of the moving metal plate shrinks to half of the original length (that is, shrinks to 4 meters). When it falls into the pit and suddenly stops moving, its length will expand relatively. When it expands relatively to fill the 0.2 meters, it will continue to expand and be squeezed by the pit wall. What is the source of this expansion force (how is it formed)? The theory of relativity cannot answer this question.

Plates and pits before the start of relative movement.

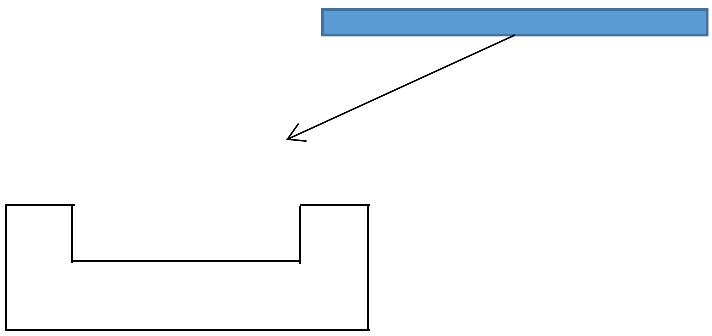

Figure 2. Observation in a relatively static system, a metal plate moving diagonally falls into the pit.

4. Observe the thin plate with oblique perforated holes in the inertial system

Change the pit in the above example (case 3) to a bottomless pit (that is, it becomes a frame). Other conditions and status remain unchanged. Observing from the ground, the thin plate moving diagonally can pass through this bottomless pit. However, looking at the moving thin plate, because the length of the pit shrinks more than the length of the thin plate (the length of the pit is originally smaller than the length of the thin plate), the thin plate cannot pass through this bottomless pit. The special relativity principle and the inference of the ruler contraction of motion have entered a dilemma, which constitutes the ruler contraction paradox. This example reveals the relative paradox of space contraction in the difficulty of space contraction. The solution is still to recognize that "the shrinkage of space due to motion is only the need of the mathematical formal system of special relativity."

The mathematicization of theory (establishing a mathematical formal system for the theory) pursues the integrity and beauty of the theory. This article explains that the problem of special relativity comes from the concept proliferation caused by its mathematical formal system. This is also a manifestation of imperfect theory. This shows that the concept of proliferation of the theoretical mathematical formal system must be partly discarded. In other words, the interpretation of "quantity" in the theoretical mathematical formal system must be continuously improved and optimized.

The physics concept in the mathematical formal system of the physics theory is allowed to have no corresponding objective reality. It is similar to complex numbers that allow no corresponding objective reality in pure mathematics. They all describe the needs of objective reality. The mathematical formal system of physics theory is not equal to its mathematical logic system (We do not allow the mathematical logic system to conform to the facts). The positive effect of the mathematical formal system is to "strengthen the logical connection between concepts and perfect the theoretical system", and its side effect is to cause the proliferation of some untrue conclusions (or proliferation of unreal concepts). It is not surprising that a true conclusion is occasionally derived from the unreal concept or conclusion of hyperplasia. Recognizing the structural and functional laws of this kind of physics theory can make human beings look at the existing theories more dialectically. Recognizing the structural and functional laws of this kind of physics theory can make human beings look at the existing theories more dialectically. The law that the theoretical mathematical formal system can lead to the proliferation of concepts is also applicable to general relativity, quantum mechanics, and even engineering technology theories. Readers can try to prove whether "space bending", "quantum teleportation", "quantum state superposition" and "quantum superposition state collapse" are accretive concepts. Superstring theory first establishes a purely mathematical formal system and then adds corresponding physical explanations to this system. Only when the mathematical form of the theory is absolutely flawless, the superstring theory is correct. If superstring theory cannot be verified by experiments anyway, it proves that the mathematical formal system of superstring theory is flawed.

In fact, this article provides a principle that can be used to judge the correctness of the old and new theories and the correctness of the theoretical support and opposition.

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