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Original Research Article

4D space-time contraction PK 2D Lorentz contraction

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ABSTRACT

Background: Special relativity treats a moving object as a rigid body and does not discuss the relativistic effects of the motion of the particles that make up the object. This unrealistic approach has misleading effects on the "application of special relativity" and the "concept of space-time". It is necessary to eliminate this misleading effect.
Methods: Considering the actual composition of moving objects, the effect of motion on mass is obtained according to the relativistic mass velocity relation, and then the actual relativistic motion effect is obtained.
Results: The volume of a non rigid body shrinks in all directions due to motion. This is inconsistent with the conclusion that the moving space contracts only in the direction of motion. When a non rigid body moves at a super high speed, the space around it will be distorted (even if the object is only inertial, the space is not guaranteed to be flat).
Conclusions: The actual composition and structure of a moving object cannot be ignored. The motion of space and the contraction of space due to motion are unrealistic. This leads to the doubt of the world view that "space has relativity".

Keywords: Theory of relativity, Rigid bodies, Inertial motion, Mass-velocity relation, 3D relativistic contraction, Moving mass black hole

INTRODUCTION

Special relativity defenders only admit that the theory has only two basic assumptions: The principle of relativity and the principle of constant speed of light. However, to successfully apply special relativity and answer questions, some tacit opinions (default argument) must be added. For example: (i) the internal composition and structure of the moving object can be ignored and treated as a rigid body so that the relativistic effect caused by the moving mass can be ignored; (ii) the law of X, Y, Z changing with velocity in the mathematical equation of Lorentz transformation must represent the law of real space with velocity; (iii) people can create movement for empty space (nothingness); (iv) the contraction of space due to movement must be able to hold the objects in the space to shrink synchronously; (v) the observer inside the motion system cannot feel any changes caused by motion factors of himself and the objects around him. When the motion stops, everything in the system can be restored to its original state. Default argument (i) is to clear the way for default argument (iv). If there is no default argument (i) and (iv), the contraction of space due to motion obtained according to the Lorentz transformation cannot be converted into the shortening of object length due to motion. Without the default argument (ii), the conclusion derived from the Lorentz transformation cannot be applied. If there is no default argument (iii), the special theory of relativity cannot be directly verified experimentally. If there is no default argument (v), the special principle of relativity cannot be established (or the conclusion of equal weight of different inertial frame

tables cannot be established). These default arguments are actually assumptions too (hidden assumption). Too many assumptions in a theory seriously affect the rigor and reliability of the theory. Only when these overt and hidden assumptions are undeniable can the self-consistency of the theory be guaranteed. If these chiaroscuro assumptions can be proven unfounded, then special relativity cannot be said to be self-consistent. Discussing the reliability of these hidden assumptions is undoubtedly an important topic, and it is naturally an important research goal. After using the "method" to arrive at the "result", it is not difficult to find that these default arguments lack scientific basis. Problems with special relativity have been pointed out publicly by many people.[1-10] The author of this paper has also discussed the logical problems of special relativity.[11-16] However, we have not seen a discussion of the reliability of the hidden assumptions of the above special theory of relativity. Actual objects are not rigid bodies but solid bodies with internal composition and structure. Ignoring the internal composition and structure of moving objects is clearly out of practice. Whether an approximation can be taken and a moving object can be regarded as a rigid body depends on whether the strength of the relativistic effect of the motion of the particles composing the moving object is equivalent to the strength of the relativistic effect derived from the Lorentz transformation. By convention, only the strength of the former relativistic effect is smaller than that of the latter relativistic effect by more than two orders of magnitude, so that the former relativistic effect can be ignored and the moving object is regarded as an approximate rigid body. This paper mainly discusses qualitatively and quantitatively the actual relativistic effects produced by non-rigid body motion. It was concluded that the relativistic effects of the two motions mentioned are comparable in strength and qualitatively different. The mass of an object increases with speed. Can the moving mass be large enough to become a black hole? This is another big question that this article will show the reader. After deriving the relativistic effect of mass and the extended relativistic effect of moving mass, this paper shows that the above-mentioned default view of relativity is unfounded. The ultimate research goal of this paper is to expose the logical problems of special relativity and correct the wrong view that "space has relativity" that has been formed by human beings.

METHODS

The research method used was logical analysis, including quantitative analysis，qualitative analysis, theoretical analysis and thought experiment. The cases analyzed include practical cases and newly enumerated cases. Study was conducted from March, 2022 to June, 2022.

The relativistic mass=velocity relation is $m=\gamma m_0$. The hydrogen atom radius is expressed as, $a_0 = \hbar^2 / 4\pi^2 \mu e^2$.

Where μ is the reduced mass, which conforms to the mass-velocity relation $\mu=\gamma\mu_0$. Substituting it into the a_0 expression, it can be concluded that the radius of the hydrogen atom will become smaller due to motion. The volume of a solid hydrogen ruler made of hydrogen atoms is also reduced by motion (as the radius of hydrogen atoms shrinks, the volume of solid hydrogen composed of hydrogen atoms shrinks three-dimensionally)

$V=\gamma^3 V_0$. (1)

This is the expression for the volume contraction of non-rigid bodies due to motion. The shrinkage coefficients in the three mutually perpendicular directions are all γ. This contraction is a three-dimensional relativistic contraction of the volume of a moving object. For the space contraction under Lorentz transformation due to motion, the expression for contraction is

$V=\gamma V_0$. (2)

The contraction of space due to movement occurs only in the direction of movement, not in other directions. That is, the contraction of the space due to motion obtained according to the Lorentz transformation is one-dimensional (it can be called one-dimensional Lorentz contraction). As long as we believe in the relativistic mass-velocity relation, we must be able to draw the conclusion that "the vibration frequency of the internal particles of a moving object decreases, and all the thermodynamic processes in it slow down". This is one of the physical mechanisms by which the time count value becomes smaller due to movement. It is also one of the mechanisms by which the timeline shortens (shrinks) due to movement.

Since the relativistic effect caused by the mass-velocity relation of the particles inside the moving object cannot be ignored, according to $m=\gamma m_0$, as long as the velocity is large enough, the inertial motion particles or moving objects can reach the black hole condition. To turn an ordinary small object (or even a proton) into a Schwarzschild black hole, all it takes is a velocity of 0.999…9c (76 consecutive “9”).[16] A proton moving at such a high speed is a moving mass black hole, and a moving mass black hole is also a moving black hole. This tells us that even with inertial motion, the space around a non-rigid body cannot always remain flat. Taking the Schwarzschild black hole as a model, theoretical calculations show that as long as the moving speed of the object exceeds 0.999…9c (30 consecutive “9” in total), the space distortion caused by the moving mass cannot be ignored.[16] In astronomy and astrophysics, distant objects regress with us at speeds approaching or even exceeding the speed of light. Therefore, we cannot fail to discuss motion very close to the speed of light. The proton in the above example is replaced by a hydrogen atom, and other conditions remain unchanged, except that there is a process in which a hydrogen atom becomes a neutron,

and other processes and results remain unchanged. This example raises a thought-provoking question: When discussing the volume relativistic effect of the high-speed motion of hydrogen atoms, why should relativity experts prefer the path where the unidirectional contraction of the motion space leads to the flattening of the entity hydrogen atoms? Why don't we choose such a theoretical application path: the mass of the hydrogen atom increases due to its movement, which further leads to the stereoscopic contraction of the hydrogen atom. The former is obviously a path with many subjective factors, no clear physical mechanism and the need to convert space contraction into volume contraction! The latter path contains a clear physical mechanism. It must be much more powerful to choose it!

RESULTS

It can be seen from the previous section that, instead of treating the moving object as a rigid body, considering the relativistic mass-velocity relation and the relation between the "atom size" and "the mass of the particle in the atom", two important results can be obtained: result 1, the volume of the non-rigid body in motion shrinks in all directions, and the volume shrinkage of this non-rigid body is independent of the shrinkage of space due to motion; result 2, the space around the hypervelocity inertial motion object cannot always remain flat. The former can be contended with the conclusion derived from the Lorentz transformation that space contracts only in the direction of motion due to motion. The latter leads to the concept of moving mass black holes, and makes the existence of the time-dependent gravitational equation necessary.

DISCUSSION

Equation (1) is not the same as equation (2) (the former is three-dimensional volume shrinkage, the latter is one-dimensional space shrinkage). The physical mechanisms that determine equations (1) and (2) are also different (the former is the relation between mass and velocity and the size of the velocity atoms, and the latter is only a mathematical equation such as Lorentz transformation). It can be seen from these two "not identical" that the one-dimensional Lorentz contraction of the motion space and the three-dimensional relativistic contraction of the motion non-rigid body are independent of each other and cannot be replaced by each other. When we apply the conclusion of the relativistic contraction effect, we must choose one of the two equations (1) and (2). Even if equation (2) is selected, in order to convert (or used to describe) the shrinkage of space due to motion derived from the Lorentz transformation into (or used to describe) the shrinkage of the volume of an object due to motion, the default arguments (i)-(iv) are all reliable. This leaves option equation (2) with no advantages but only disadvantages. One reason is that treating solid hydrogen as a rigid body is unrealistic. Even if equation (2) is chosen, the existence of atoms and molecules inside the moving object and the relativistic effect of its motion cannot be prevented. That is to say, if equation (2) is chosen subjectively, equation (1) cannot be excluded objectively (that is, if equation (2) is selected, both equations (1) and (2) must be used to describe the process that occurs in the target object). In this case, the Lord must admit that a double contraction occurs in the direction of motion of the moving body. There is no such problem if only equation (1) is selected. Considering the fact that no one has found a moving object to have a double contraction in the direction of motion, we can be sure that the one-dimensional Lorentz contraction of the moving space is unreliable. Another important reason for both default argument (i) and "choice equation (2)" is that, if all moving objects are rigid bodies, and the moving clock is also a rigid body, a clock that is a rigid body will not be slowed down by motion because a rigid body clock is fundamentally will not run (does not complete the timing work). In other words, if a moving object is treated as a rigid body (even a moving clock is not spared), we can't talk about a moving clock slowing down. There is no reason why we must treat a moving clock differently from a moving ruler. Real moving objects are not rigid bodies. From the point of view of considering relativistic effects, all objects are sufficiently different from rigid bodies to be negligible (in the context of special relativity). The special theory of relativity considers the relativistic effect of moving bodies, which is the pursuit of a more precise description of natural phenomena (seeking to be more precise than Newton's theory). Therefore, special relativity cannot approximate real objects as rigid bodies (the approximation of special relativity is to approximate the space with small mass of matter as flat space, instead of approximating moving objects as rigid bodies). The effects of mass-velocity relations in special relativity on space and time are quantitatively of the same order of magnitude as those determined by the Lorentz transformation on relativistic effects. The effects of mass-velocity relations in special relativity on space and time are quantitatively of the same order of magnitude as the relativistic effects determined by the Lorentz transformation. Generally speaking, as long as the relativistic effect of the mass-velocity relation cannot be ignored, it is impossible to treat the object in reality as a rigid body and ignore the relativistic effect of the particles that make up the object. To sum up, default arguments (i) and (ii) lack scientific basis. Choice equation (1) is better than choice equation (2). It can be seen from the Lorentz transformation that in the mathematical coordinate axis, both a space coordinate axis and a time coordinate axis are shortened due to motion. Calling "the shortening of the space axis due to motion" is called space contraction, and shortening the time axis due to motion is called time dilation, which is not the best choice (it's better to call them contraction). In this way, the relativistic change of a system full of dense matter due to motion is three-dimensional volume contraction plus one-dimensional time contraction, which can be called four-dimensional relativistic contraction.

Using the same full-name method, the space-time contraction obtained from the Lorentz transformation is the two-dimensional Lorentz space-time contraction. Four-dimensional relativistic contractions can challenge two-dimensional Lorentz contractions. As long as the moving object is not regarded as a rigid body, the ultra-high-speed motion of the object may reach the formation conditions of a black hole and become a dynamic mass black hole (even with inertial motion, the flatness of space is not guaranteed. Distortion of space is not always negligible). That's what gives relativity experts a headache. Once an object becomes a moving mass black hole, the traces of its destruction by the black hole cannot be completely eliminated (for example, living creatures are torn apart by gravity and cannot be resurrected after death. Neutral objects of different compositions, structures and shapes become indistinguishable after turning into black holes, and they cannot return to their pre-movement state when they stop moving). If the relativistic mass-velocity relation is accepted, and the dynamic mass and the rest mass have the same function, the default argument (v) does not hold. If the default argument (v) does not hold, the special principle of relativity cannot be widely held. This is the inference from result 2- the special principle of relativity is not universal (denoted as Corollary 1). Another point worth discussing about result 2 is: Is the function of moving mass exactly the same as that of rest mass? What about the delay law of space curvature? Is it necessary to establish a time-dependent gravitational field equation? What is the difference between the dynamic mass gravitational equation and the stationary mass gravitational equation? It can be seen that according to result 2, it can be concluded that “the appearance of moving mass black holes does not support the special principle of relativity”.

It is logically impossible to speed up an infinite space that is empty. The reason is：Such a space can neither be affected by any force nor exert any force on other objects; No space for infinite space to move; Movement without objects is equal to no movement; The saying "empty space moves in space" has both language defects and the problem that one space is separated from another space. Even a space full of virtual particle pairs or fields cannot be accelerated by the container walls (as long as the fields are not emitted by the container walls). Accelerating an object can only cause the object to move (traverse) in space, rather than creating a moving space (let alone creating an moving infinite space). In this way, the motion state of the empty space can only be determined by people in their consciousness. As long as there is no God's first push, the void cannot be accelerated by the force of nature, which determines that the void space can only be absolutely static (there is no inertial inertial motion in space). There is no practical process to prove that "accelerating objects in space by accelerating space". No experiment has directly demonstrated that rigid bodies in space can be compressed by compressing space. No experiment has directly demonstrated that objects embedded in space can be accelerated by accelerating space. There are many facts to the contrary. For example, without friction, the passengers in the car cannot accelerate with the car. The space inside the carriage is considered to move with the train when the train is in motion. This is the usual practice of special relativity. Why isn't space relatively immobile while trains travel through space? It should be known that the special theory of relativity frequently involves the infinite space A moving in the infinite space B, and thinks that the space A can pass through the space B. It should be more convenient for objects to travel through space than for space to travel through space! Since "space accelerates objects, moves objects with them, and compresses objects in space by compressing space" can't be done, why can the contraction of space due to motion cause objects embedded in space to shrink synchronously? If a moving ionic crystal is considered to contract only in the direction of motion as it moves, then Coulomb's law does not hold in the direction of motion of the crystal. But Coulomb's law holds true in the direction perpendicular to the motion. It can be seen that admitting that space shrinks due to motion, and the shrinking is one-way, destroys the special principle of relativity. We can be sure that neither default arguments (iii) nor (iv) are reliable. One of the reasons that Einstein found for the principle of relativity when he established the special theory of relativity is that the experimenter does a mechanical experiment in a carriage that is undergoing inertial motion, and cannot find that he and the carriage are moving. However, this phenomenon can be explained in addition to "in the inertial frame, the covariance of mechanics laws", there is another explanation: the object with mass conforms to the law of inertia. In the condition of the existence of the absolute static system, "the observer cannot find the inertial motion in which he is in the inertial system by doing the mechanical experiment". The reason for this can be "the absolute velocity of the inertial frame is low, and the accuracy of the experiment is not high".

The discussion of the above two natural paragraphs shows that: whether it is based on theory or practice, it can be proved that human beings cannot accelerate the empty space that can neither receive force nor exert force on other objects; space cannot move. Since space cannot be accelerated, space cannot move without the first push of God (and without God, space can only be absolutely static all the time). As long as space cannot move, the contraction of space due to motion is empty talk, and space is not relative (Corollary 2). Human understanding of space must be revised again. The special theory of relativity assumes that the motion of an object holds the space around it to move with it. It also defaults to the fact that the volume of the object shrinks synchronously as the space shrinks due to motion; default arguments (i)-(iv). The latter is a superficial relativistic shrinkage mechanism in which space affects the volume of an object (incomplete and unclear mechanism of ruler

retraction). In generalized relativity, it is recognized that objects (substances) affect space rather than space affecting objects. It's all relativity, why choose the opposite order in terms of the order of who caused the deformation of space and objects? The results of mechanical experiments in a carriage moving in a straight line at a uniform speed can be explained either by "the carriage and the space in the carriage move together" or "objects obey the law of inertia". Are we justified in denying the latter explanation? From a philosophical point of view, change is relative and temporary, change is absolute. The conditions have changed and still remain absolutely unchanged, which is not philosophical. In fact, the problem of the principle of constant speed of light is also related to the determination of the nature of space. When an observer A, only 5 mm/s slower than the speed of light, passes a light source, the light source emits a photon (it can also be a small section of strong laser beam, as the target photon group) in the same way. Observed in other inertial frames, observer A can grab the target photon group by hand, and can go around the front of the laser beam and let the laser beam penetrate the metal foil he is holding, resulting in a small hole in the metal foil. Observers in other inertial frames can actually observe that there is a hole in the metal foil held by observer A (that is, observers in other inertial frames acknowledge this fact). However, according to the special theory of relativity and the Lorentz transformation, the speed of the target photon group observed by A must still be the speed of light, and the metal foil being pierced will not happen. This is the result of unconditionally believing in the Lorentz transformation and those default arguments and denying objective facts. Combined with the above series of analyses, the reason for the constant speed of light can only be that the space mentioned in the special theory of relativity is apparent space (subjective space or formal space.[17] Under a small number of special conditions, using the concept of subjective space can just get an approximation correct result). The speed of light calculated by the special theory of relativity is the formal speed (apparent speed), and its speed unit is (formal space or apparent space)/(time).

Considering result 1 and the analysis of the above natural paragraphs, I can get corollary 3: The space mentioned by the special theory of relativity is formal space or subjective (or subjective or mathematical formal) space rather than real space (only when the concept of subjective space is used, the speed of light can be guaranteed to be constant). Corollary 4 can also be obtained: the real empty space cannot move, let alone shrink due to movement. What can move and contract with movement is apparent (or subjective or mathematical formal space) space. The above research results (especially the authenticity of space contraction due to motion is strongly questioned) show that special relativity cannot still be divided into space-time theory. Since the relativistic change of four-dimensional space-time is not real, it affects the reality of the space distortion of general relativity due to mass (the warping of space-time by the distribution of matter is probably just a way of describing gravity, not that space can really be warped). If (a) Hubble's law holds, (b) the principle of special relativity conforms to the facts, (c) the mass velocity relation conforms to the facts, and (d) the dynamic mass is completely equivalent to the static mass, an important inference can be obtained from result 2. All larger objects are likely to be black holes at distances close to the speed of light relative to our earth (Corollary 5). A large number of black holes in such a large area can certainly lead to the collapse of our universe. However, the reality is that our total galaxy is stable. This indicates that at least one of the four conditions (a), (b), (c) and (d) is unreliable. The most unreliable one is (d) the principle of special relativity. There is reliable evidence for other conditions. Comprehensive result 2 and the content of this natural paragraph can add points to Corollary 1. The reason why the principle of special relativity and Lorentz transform are applicable in electrodynamics is that Doppler frequency shift is only related to relative motion. As mentioned earlier, in the inertial frame, the approximate application of the principle of special relativity is the performance that a mass object has inertia. After careful analysis, it is not difficult to see that the space mentioned by the special theory of relativity is only the mathematical coordinate framework in the Lorentz transformation; the clocks that Einstein placed at various points in the space are either the clocks in the mind (or the apparent clocks) or are composed of rigid bodies Clock that doesn't work. There are two serious problems in the "inference of space contraction due to motion": the acceleration of space and the physical mechanism of motion; the physical mechanism of space contraction due to motion.

CONCLUSION

Combining the two research results and five corollaries of this paper with some logical analysis, we can draw the following conclusions. that the precision and scope of application of special relativity are limited. The precision and scope of application of special relativity are limited. The approximate application of the principle of special relativity and Lorentz transform in the field of low velocity inertial frame and electrodynamics is determined by "Doppler frequency shift is only related to relative velocity" and "mass objects conform to the law of inertia". The conclusion that space shrinks due to motion is not reliable (space is not relative). The infinite space of nothingness is absolutely static. An absolutely moving object contracts in all directions (pace shrinkage under Lorentz transformation is apparent shrinkage). The clock of absolute motion slows down. Objects in high-speed inertial motion can become dynamic-mass black holes, causing space to warp.

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