Inquiry, vol. 8, no. 2, December 2007, pp. 242 – 249 *IIGSS Academic Publisher*

MOVING OBJECTS OBSERVATION THEORY IN PLACE OF SPECIAL RELATIVITY

LI ZIFENG

Petroleum Engineering Institute, Yanshan University, Qinhuangdao, Hebei , 066004, China
E-mail: zfli@ysu.edu.cn

(Received September 18, 2006; In final form May 30, 2007)

This paper introduces the basic hypotheses and viewpoints on space-time of the special relativity as well as of the moving objects observation theory. It proposes a new concept called the visual space–time and derives the relationship among the realistic space–time of moving coordinate systems, the visual space–time and the realistic space-time of static coordinate systems. From the analysis of comparison, I conclude that the moving objects observation theory has solved the measurement problem of moving objects. Movement cannot cause changes in length, in time or in mass. Also, there does not any light barrier. So the special relativity should be abandoned.

Keywords: special relativity, Lorentz transformation, velocity of light, moving objects observation theory

In order to resolve the measurement problem of moving objects, Albert Einstein presented the theory of special relativity a century ago [1-2]. Now, this theory as well as its author, A. Einstein, is well known all over the world. Universities and colleges choose the special relativity as a required course. But the rationality of the set-up process of the special relativity and the accuracy of its inferences have always been doubted or criticized [3-21]. Recently, Wang Zhihai and Xu Hui delivered the observation theory of moving objects, which solved the conversion between observations and the real values, and removed one major theoretical obstacle in way of development of physics.

This paper introduces briefly Einstein's special relativity as well as Xu Hui and Wang Zhihai's observation theory of moving objects, compares and analyses the basic assumptions and their transformation formulas of the two theories in details. Our study suggests that the observation theory of moving objects should be employed to replace the special relativity.

1. AN OUTLINE OF THE SPECIAL RELATIVITY [1-2]

1.1. The Basic Assumptions of the Special Relativity

(1) The principle of relativity. The laws of physics are the same in all inertial frames of reference. In other words, there are no privileged inertial frames of reference.

(2) The principle of constant velocity of light: (i) the speed of light in a vacuum is a universal constant, *c*, which is independent of the motion of the light source[1]. (ii) Speed of light in a vacuum as measured in all inertial frames of reference moving uniformly along beelines with respect to each other are equal[2].

1.2. Lorentz Transformation of Coordinates

There are two coordinate systems K and K' ($OXYZ$ and $O'X'Y'Z'$) as shown in Figure 1. Corresponding axes are parallel to each other and move uniformly motion in along a straight line. The speed of the coordinate system K relative to K' is v moving in the direction along the X axis. And the clock starts clicking at the moment when O coincides with O'.

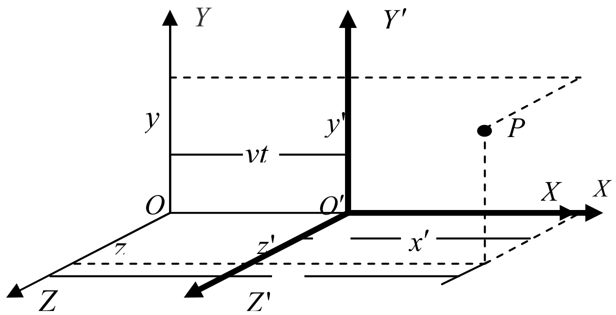

Figure 1. Coordinate transformation

Suppose that (x, y, z, t) expresses an event appearing in the coordinate system K at time t, while the same incident appears in the coordinate system K' at the time t' at the point (x', y', z'). Then, the space-time coordinate systems (x, y, z, t) and (x', y', z', t'), which express the same event, obey the Lorentz transformation of coordinates:

$$\left.\begin{aligned} x' &= \frac{x - vt}{\sqrt{1-(v/c)^2}} \\ y' &= y \\ z' &= z \\ t' &= \frac{t - \frac{vx}{c^2}}{\sqrt{1-(v/c)^2}} \end{aligned}\right\}, \tag{1}$$

and

$$\left.\begin{aligned} x &= \frac{x' + vt'}{\sqrt{1-(v/c)^2}} \\ y &= y' \\ z &= z' \\ t &= \frac{t' + \frac{vx'}{c^2}}{\sqrt{1-(v/c)^2}} \end{aligned}\right\}, \tag{2}$$

in which c represents the velocity of light.

The derivation process of Lorentz transformation of coordinates is as follows.

For the point O, observing it from the coordinate system K, no matter what the time is, it is always $x = 0$, but observing it from the coordinate system K', at the time of t', the coordinate is $x' = -vt'$, that is, $x' + vt' = 0$. From these, at the same space and time point, the numbers x and $x' + vt'$ change into zero simultaneous. This makes people think naturally that anytime x and $x' + vt'$ have a scale relation. Suppose this constant of proportionality as k, so

$$x = k(x' + vt') \tag{3}$$

Discussing the point O' in the same way leads to

$$x' = k'(x - vt) \tag{4}$$

According to the relativity principle of the special relativity, K equals to K', the two equations above should be the same, so constants k should be equal to k'. That is,

$$k = k' \tag{5}$$

So

$$x' = k(x - vt) \tag{6}$$

For acquiring certain transformation rule, the constant k must be obtained. According to the principle of the constant velocity of light, assume that at the time（$t = t' = 0$）when the light signal coincides at the points O and O', the movement of the coordinate systems starts from the coincident point and moves forward along the coordinate axis OX, and at any time moment t (t' in coordinate system K'), the light signal's coordinates in the two coordinate systems are:

$$x = ct, x' = ct' \tag{7}$$

Multiply (6) and (3), then substitute (7) into the result

$$k = \frac{c}{\sqrt{c^2 - v^2}} = \frac{1}{\sqrt{1 - (v/c)^2}} \tag{8}$$

Then get

$$x' = \frac{x - vt}{\sqrt{1 - (v/c)^2}}, t' = \frac{t - \frac{vx}{c^2}}{\sqrt{1 - (v/c)^2}}$$

$$x = \frac{x' + vt'}{\sqrt{1 - (v/c)^2}}, t = \frac{t' + \frac{vx'}{c^2}}{\sqrt{1 - (v/c)^2}}$$

1.3. The Space-Time View of the Special Relativity

Based on Lorentz transformation, the special relativity finds out:

(1) Question of simultaneity. Assume that two events appear at two points in a coordinate system synchronously. However, the time moments that these two events appear, as measured in another coordinate system, are not the same.
(2) Question of contracting length. In a coordinate system that is in motion with respect to an object, the length of the object as measured along the moving direction of the system is shorter than that measured in another coordinate system in which the object is at rest.
(3) Question of expanding time. The time measured in a coordinate system that is in motion with respect to the place an event appears is longer than that measured in another coordinate system in which the place is at rest.

1.4. Dynamics of the Special Relativity

(1) The mass of an object measured in a coordinate system that is in motion with respect to the object is larger than that measured in another coordinate system in which the object is at rest.
(2) The energy of an object equals its mass times the square of the speed of light.

2. SUMMARY OF THE MOVING OBJECTS OBSERVATION THEORY[20-21]

2.1. Basic Assumptions of the Observation Theory of Moving Objects

(1) All laws that describe movements are equivalent in all inertial coordinate systems moving uniformly along beelines of each other.
(2) Light travels in a vacuum or other medium at the speed c with respect to its source.

2.2. Some Concepts

(1) The absolute time. Suppose that some clocks have the same structure and can tick at the same speed (or "hour rate"), and are adjusted so that they all point to the same position at a same time moment. Then, no matter in which reference systems in whatever states of motion these clocks are placed and no matter where in the reference systems these clocks are positioned, these clocks still tick at the same speed and point to the same place at the same time moments.
(2) The actual time. Define the time when an event occurs, the clock at the location of the event points to as the actual time. Note that the concept of time includes two meanings: "moment" (corresponding to the time coordinate at the location of the clock) and "time interval" (the interval between two time coordinates).
(3) The visual time. This is the time an observer obtains at his special location by measuring the movement of an event using the light signals.
(4) The absolute length. This is the length measured by some identically constructed rulers at any position in any coordinate system.
(5) The actual length. It is defined to be the length of an object measured by using a ruler in a coordinate system with which the object moves.
(6) The visual length. This is the length an observer obtains at his specific location from measuring an event in motion by making use of the light signals.
(7) The visual space-time. This is the visual space-time, consisting of the length and time an observer obtains at his specific location by measuring a moving event with the help of light signals.

2.3. Transformation Between Visual Space-time and Moving Space-time

As for the two Galileo coordinate systems, as shown in Figure 1, if an event happens statically in the coordinate system K', then the measurement of the event from the coordinate system K gives:

$$\begin{cases} x_{\mathrm{v}} = \dfrac{x' + vt'}{1 - v/c} \\ y_{\mathrm{v}} = y' \\ z_{\mathrm{v}} = z' \\ t_{\mathrm{v}} = \dfrac{t' + x'/c}{1 - v/c} \end{cases} \tag{9}$$

in which $(x_{\mathrm{v}}, y_{\mathrm{v}}, z_{\mathrm{v}})$ is the visual coordinate and t_v the visual time in the coordinate system K; (x', y', z') is the actual coordinate and t' the actual time in the coordinate system K'; v stands for the departing velocity of the two coordinate systems along the direction X, if the systems are getting closer, this value will be negative.

2.4. The Time Interval and Length

From (9), one can derive the relationship between the visual time interval and the actual time interval, and that between the visual length and actual length in moving direction as follows:

$$\begin{cases} \Delta t_{\mathrm{v}} = \dfrac{\Delta t'}{1 - v/c} \\ \Delta x_{\mathrm{v}} == \dfrac{\Delta x'}{1 - v/c} \end{cases} \tag{10}$$

While the moving-away coordinate system has an event happening, the observed time interval of the event's evolution is longer than its actual time interval. For example, a moving-away watch has been clicking for one hour, while the observer's watch in the relatively still coordinate system indicates that only an hour and ten minutes passed by. When observing an event in a moving-back coordinate system, the visual time interval of the observed event's evolution is shorter than its actual time interval. For example, the moving-back watch has been moving for an hour, while the observer's watch in the relatively still coordinate system says it has been clicking only for fifty minutes.

When observing a moving-away object, its length seems to be elongated in its moving direction; when observing a moving-back object, its length seems to be shortened in its moving direction.

2.5. The Instauration of True Values

Because of the measurement effect caused by the limited propagation velocity of light, the measured results are not the objective reality itself. Only by eliminating the measurement effect can one find the objective reality itself:

$$\begin{cases} x = x_v(1-\frac{v}{c}) \\ y = y_v \\ z = z_v \\ t = t_v(1-\frac{v}{c}) - \frac{x'}{c} \end{cases} \tag{11}$$

$$\begin{cases} \Delta t = \Delta t_v(1-\frac{v}{c}) \\ \Delta x = \Delta x_v(1-\frac{v}{c}) \end{cases} \tag{12}$$

where (x, y, z) is the real coordinate and t the real time in the coordinate system K .

2.6. The Real Space-time Transformation Between Two Galileo Coordinate Systems

Substituting equ. (9) into equ. (11) leads to

$$\begin{cases} x = x' + vt' \\ y = y' \\ z = z' \\ t = t' \end{cases} \tag{13}$$

3. COMPARISONS BETWEEN THE SPECIAL RELATIVITY AND MOVING OBJECTS OBSERVATION THEORY

Table 1 shows the comparisons between the special relativity and the observation theory of moving objects. It is clear that the observation theory of moving objects not only has the theoretical and practice foundation, but also contains no fallacy.

Table 1 Comparisons between the special relativity and observation theory of moving objects

Item		Special relativity	Observation theory of moving objects
Basic assumptions	1	Each law describing movements is equivalent in all inertial frames of reference moving uniformly along beelines of each other.	
	2	The speed of light in a vacuum is constant, and it has nothing to do with the state of motion of its source. Not verified.	The speed of light relative to its source in a vacuum or any other medium is constant. Verified.

Space-time transformation equation	$\left.\begin{aligned} x &= \frac{x'+vt'}{\sqrt{1-(v/c)^2}} \\ y &= y' \\ z &= z' \\ t &= \frac{t'+vx'/c^2}{\sqrt{1-(v/c)^2}} \end{aligned}\right\}$	$\begin{cases} x = x'+vt' \\ y = y' \\ z = z' \\ t = t' \end{cases}$
Length shortening	Often shortened.	No shortening for the real length. Away, the visual length extends; near, the visual length shortens.
Simultaneity	At different times.	At same times.
Time prolonging	Often prolonged	No prolonging for the actual time. Away, the visual time prolongs; near, the visual time shortens.
Mass increase	Often increased	No
Light barrier	Yes	No
Paradoxes or mistakes	Yes	No

4. CONCLUSIONS

(1) The observation theory of moving objects has resolved the measurement problem for moving objects (especially for high-speed traveling objects).
(2) Movement cannot trigger any change in length, time and mass. And, there is no light barrier.
(3) The special relativity should be abandoned in comparison.

References

1. A. Einstein. On the Electrodynamics of Moving Bodies. *The Principle of Relativity*, Methuen and Company Ltd. of London, 1923.
2. Cheng Shuozhu, Jiang Zhiyong. *General Physics*. Beijing: People's Education Press, 1978: 231-254. (In Chinese)
3. Xu Shaozhi. The Mathematic Basis of Relativity is Wrong. *Invention and Innovation*, 2001, (1):32-33. (In Chinese)
4. Xu Shaozhi. To Look at Scientific Platform, New Events Happen in China. *Invention and Innovation*, 2001, (2):34-35. (In Chinese)
5. Xu Shaozhi. Misunderstandings on Mass-Energy Relations. *Invention and Innovation*, 2002, (2):32. (In Chinese)
6. Xu Shaozhi, Xiang Qun. Generalized Relativity Is So Different From Science. *Invention and Innovation*, 2002, (3):30-31. (In Chinese)
7. Xu Runsheng. SR Goes Against Factuality Principles. *Invention and Innovation*, 2002, (10):32. (In Chinese)
8. Zhu Jidong. Discussing the Fundament of the Experiment about the Special Relativity. *Journal of Shanghai University of Electric Power*, 2003, 19(3):57-60. (In Chinese)
9. Cui Jidong. On China's Own Innovation Way -Impressions of Reading "Rethought on Relativity". *Invention and Innovation*, 2003, (3):34. (In Chinese)
10. Lei Yuanxing. Criticizing Voice on Relativity is Worth Analyzing in Two Ways-The First Impression of "Rethought on Relativity". *Invention and Innovation*, 2003, (3):37. (In Chinese)
11. Huang Zhixun. Theoretical Development and Experimental Examinations in Special Relativity. *Engineering Science,* 2003, 5(5):8-12. (In Chinese)
12. Liu Dayi. A Debate between Relativity and the Concept of Classics' Space-Time & Matter. *Invention and Innovation*, 2003, (9):36. (In Chinese)
13. Xiang Qun. Do Away with Superstitious and Read Relativity Cautiously. *Invention and Innovation*, 2003, (10):36. (In Chinese)
14. Liu Dayi. Making Zero Divisor Is a Math's Mistake. *Invention and Innovation*, 2003, (10):37. (In Chinese)
15. Huang Demin. *On the Essence of Physical phenomenon –Matter Effect Study Challenges Relativity*. Shanxi Science and Technology Publishing House, 2001. (In Chinese)

16. Song Zhenghai, Fan Dajie, Xu Shaozhi, Hao Jianyu. *Rethinking on Relativity*. Earthquake Publishing House, 2001. (In Chinese)
17. Qi Ji. *New Physics*. Publishing House of Northeast Forestry University, 2003. (In Chinese)
18. Li Zifeng. SR Origins from a Minstaken Explanation on Velocity of Light Constant Principle. *Finding,* 2005, Supplement: 28~132. (In Chinese)
19. Li Zifeng, Li Tianjiang, Wang Changjin, Wang Zhaoyun, Tian Xinmin. The Essence of Special Relativity and Its Influence on Science and Philosophy as Well as Society. *Scientific Research Monthly*, 2005, No.13: 80-83.(In Chinese)
20. Wang Zhihai,. Correction on Observation, *Matter Regularity*, 2004, (4):186-190. (In Chinese)
21. Xu Hui. Observation theory of moving objects, *Matter Regularity*, 2005, (13):24-29. (In Chinese)