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Time/Space Distortion Predicted Based on Adaptive Dynamical View

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Abstract

We reconsidered time/space and inertial system based on adaptive dynamics and proposed a time/space view assuming that there is no inertial system other than our universe, unique reference frame (Ando and Yamato, 2024). Here we extended the view for a system under gravity and predicted similar time/space distortion like as general relativity theory. We discuss the origin of such distortion. In addition, we speculate the mechanism of the Lorentz length contraction observed and discuss about the feasibility of our proposal, unique reference frame, or a model according to general relativity theory by Einstein.

Keywords

General Relativity Theory, Time/Space Distortion, Adaptive Dynamics, Lorentz Length Contraction

1. Introduction

Galilei [1] proposed the rule of inertial system. Newton proposed absolute time/space [2]. Einstein finally settled down the issue and established the time/space view according to his relativity theories [3]-[5]. They assumed many inertial systems exist in our universe. The speed of signal (light) has been difficult to be measured precisely [6]. Einstein assumed that independent of the motion of the light source, it is finite and constant for the observer in inertial systems or anywhere/anytime. Then he derived the special relativity theory for inertial systems and the general relativity theory for general systems.

We have proposed quantum-like formalism in information biology [7]. It may have originated from the interconnection each other or entanglement of more than two interactions. Based on its adaptive dynamical view (everything is interconnected and nothing is isolated), we assumed unique reference frame, our uni-

verse, with no other inertial system [8] [9]. By assuming constant speed of signal (light) in the unique system, we derived similar predictions of time delay and Lorentz length contraction in a moving system with constant velocity as those of special relativity theory. In this respect, another interpretation on Lorentz transformation has been proposed [10] [11].

In this article, we extend such derivation under gravity as a simple example of the time/space distortion like as predicted in general relativity theory, just utilizing the predicted results of time delay and Lorentz length contraction obtained from our model [8] [9] without assuming constant light speed anytime/anywhere. We assume the equivalence principle of gravity and acceleration, same as Einstein did. The trial was successful meaning that our model of unique reference frame, our universe, can predict consistent results as Einstein's relativity theories. Then we propose that the time/space distortion comes from the signal velocity being finite and constant, not representing the property of space structure *per se*. In addition, we speculate the mechanism of the Lorentz length contraction observed.

2. Results

Apparent time/space distortion similar to that predicted by general relativity theory

Consider a round disc rotating as in **Figure 1A**. A mass 1 stays at the disc edge. Radius is r, rotating angular speed, ω, time in the reference frame, t, time on the rotating disc observed by the observer in the reference frame, t'. The light velocity is c.

Then the centrifugal force is $r\omega^2$, which is in balance with the pulling force toward the center, a kind of gravity pulling the mass according to the equivalence principle. If it is on earth, it corresponds to g. When the disc stays static in the reference frame, the length of the edge should be $2\pi r$ with its own time t. But when it rotates, the length will appear shorter, $2\pi r\sqrt{1-(r\omega/c)^2}$, with the disc time t', where $t' = t\Big/\sqrt{1-(r\omega/c)^2}$ for the observer on the disc by observing from outside reference frame. Here we approximated the rotating motion of the disc edge as the integration of many local straight motions with the constant velocity, $r\omega$, and used the previously obtained predictions of time delay and Lorentz length contraction [8] [9].

We drew the above relations in **Figure 1B** and **Figure 1C** depending on the radius r. In **Figure 1B**, the relation is represented in a three-dimensional way owing to its Riemann geometric nature.

This simple example may be intuitively accepted to show that the apparent time/space under gravity is distorted similar as that predicted in general relativity theory.

3. Discussion

We discuss the time/space distortion in our universe based on the present and

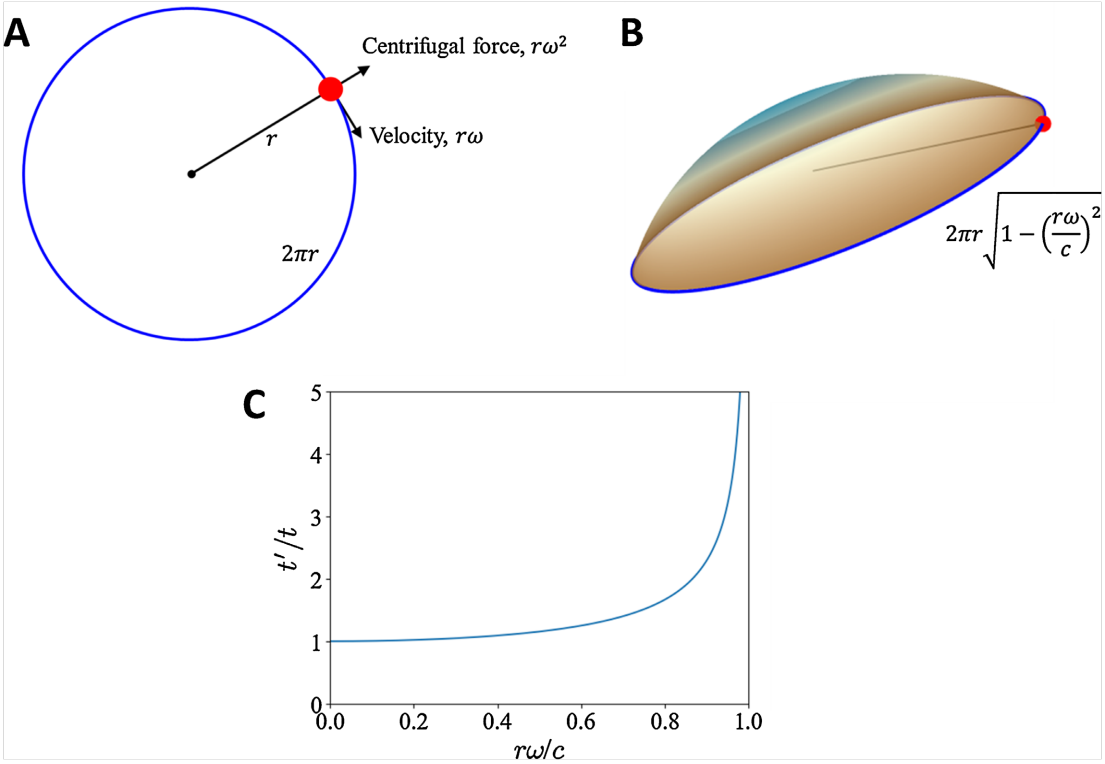

Figure 1. A model of a rotating disc. A. The rotating disc with radius r and angular rotation speed ω. The centrifugal force on the material with a mass of one at the edge is in balance with the gravity pulling down toward the center. B. The space distortion of the rotating disc. The length of the disc circle should, when observed by the observer in the reference frame, appear shorter by $\sqrt{1-(r\omega/c)^2}$ than the length staying in the reference frame ($2\pi r$). Therefore, the space appears distorted as shown. C. The time distortion. The time t' measured in the rotating disc should be longer by $1/\sqrt{1-(r\omega/c)^2}$ than the time t measured in the reference frame

previous works [8] [9].

Einstein assumed many inertial systems in his special relativity theory. We assumed one unique reference frame with no other inertial system. Both assumed a finite and constant velocity of the signal. He extended his assumptions into general systems (general relativity theory) and we here into the above example of a rotating disc system. In this study, we showed only an example of a rotating disc system. We could predict similar time/space distortion as the general relativity theory of Einstein. We think the result of our example could be applicable widely in general space, our universe. When we assume an infinite velocity of the signal, such distortion cannot be derived. Therefore, we can propose that all of these distortion effects should have originated in signaling velocity being finite. Then we may be able to conclude based on the adaptive dynamical view that the distorted structure of our universe does not reflect the space structure *per se*, but rather that materials were first created in our universe space and then that they resulted in forming the present apparent time/space structure of our universe.

Both of Einstein's and our proposals lack of basic and essential knowledge (information) concerning to the interaction mode of photon/graviton and environ-

ment such as assumed in the adaptive dynamical simulation of double slit interference phenomenon [12] [13]. Investigation into it is eagerly required. In this respect, the predicted space distortion due to gravity, causing light path curvature, must be reflecting such photon/graviton interaction.

Finally as a whole, we can summarize our works in this paper with previous ones [8] [9] as follows. Our new model seemed to provide the similar predictions as special and general relativity theories. As we have discussed in our previous paper that there is no inertial system other than our universe, we think that our model provides a probable alternative of the time/space view than Einstein's relativity theories. We think it is time to reconsider the traditional time/space view according to many inertial systems and relativity theories.

4. Speculation on the Mechanism of the Lorentz Length Contraction, Two Possible Explanations

Einstein assumed in his relativity theories that the speed of light is constant in any inertial systems (special relativity theory) or in any general systems (general relativity theory). He derived Lorentz transformation in his special relativity theory and predicted Lorentz length contraction as a transformation result.

We assumed the velocity of interacting particles including light being constant in the unique reference frame, our universe [8] [9]. To observe that the same event should take place in a moving system with constant velocity to that in the reference frame, similarly as in an inertial system of Einstein, we had to predict the Lorentz length contraction. In this sense, the prediction was not self-evident. So we compare both Lorentz length contraction in this study.

4.1. According to General Relativity Theory by Einstein—Always Constant Velocity of Light in General Systems

The general relativity theory by Einstein assumes that light (signal) velocity is always finite and constant anywhere/anytime in general systems. It predicted distorted time/space in our universe. Then we may be able to assume that interacting particles as photons for light signal and gravitons for gravity have finite and constant velocity against any individual components in the materials of the moving system, such as various atoms and chemical bonds including electrons. Therefore, the moving system looks as if a miniature universe having its various constituents in the system floating, which can be called a mini-universe. And such mini-universe resembling a universe with distorted time/space may have caused the Lorentz length contraction of the moving system as the result.

It is challenging to derive the Lorentz length contraction of the moving system according to the above model assuming a mini-universe version of the components in the materials. The difficult problem would be that any individual components show their own different velocities in addition to the system's movement with a constant velocity.

An additional question is: Relativity theories assume finite and constant light

(signal) velocity in any inertial systems (special relativity theory) and anywhere/anytime in general systems (general relativity theory), but Einstein did not explain how and why it is so; is it because the system is inertial in special relativity theory, or the light velocity is thought constant based on Michelson and Morley experiment? In this respect, it has been pointed out that we should be careful in interpreting such experiments [14].

4.2. According to Our Proposal Assuming That the Interacting Particles (Photons and Gravitons) Run and Collide with Constant Velocity with Certain Short-Range Velocity Additivity against the Unique Reference Frame, Our Universe (Assumptions in the Previous Report [9])

We have reported double slit interference simulation based on adaptive dynamical view [12]. We assumed repulsive interaction, not attractive one, for the interaction of a passing particle, a supposed photon, with interacting particles irradiated from double slit wall, supposed gravitons. We also assumed constant velocity for the passing particle. Simulation has nothing to do with the real world, but the successful simulation of interference tempts us to assume that the gravitational interaction of the components in the moving system with the interacting particles (gravitons) full in the reference frame is the repulsive collision and produces a pressure as can be called gravitational shower.

Then we can imagine that the pressure must be different between the front and back sides of the movement, a kind of shadow effect. The distribution of the individual components in the materials would be expected to show plasticity with the electromagnetic, gravitational, and other kinds of interactions between the components. Therefore, the pressure difference between the front and back sides should produce certain deformation and rearrangement in the distribution of the components, resulting in the Lorentz length contraction of the moving system.

Furthermore, we can imagine that the deformation should proceed until the whole system reaches steady state, that is, there is no apparent pressure difference. Here we should note that the velocity additivity [9] may play an important role in our model. We have already noticed and described the phenomenological correspondence in Section 4 of our previous reports [8] [9] that the view according to the general relativity theory corresponds well or seems to propose the same view as our adaptive dynamical view.

We do not know the detailed properties of such interacting particles, especially gravitons at present. So it is difficult or impossible to derive quantitative estimation of such Lorentz length contraction. But this can be an attractive hypothesis to explain the origin of the contraction.

This explanation resembles ether model as the light wave mediator [6]. We may be able to admit the gravitational shower as the mediator for the existence of any materials in the reference frame, our universe, which may also be the origin of gravity. And this model is consistent with our proposal [8] [9] that there is one unique reference frame with no other inertial system in our universe, different

from Galilei's and Einstein's proposals that there can be many inertial systems.

At present, there is no evidence for such gravitational shower. Gravitons are not even identified. However, when interacting particles such as photons and gravitons are identified and characterized precisely in future, it may turn out probable that this gravitational shower effect brings about the Lorentz length contraction, which in turn explains the assumption and/or apparent observation of the constant light velocity in any inertial systems (special relativity theory) or in general systems (general relativity theory).

4.3. Future Prospect of Scientific Investigation towards the Probable Model

Above all, the precise measurement and confirmation of the signal (light) velocity in various kinds of systems should be accomplished, whether it is constant and finite or not. The investigation, identification, and characterization of gravitons in addition to the interaction mode with photons and other particles are especially important and essential. It is also critical to examine the relaxation time of the velocity additivity as discussed previously [9] and as suggested to play an important role in our model above. These investigations should be crucial to judge which is probable, our proposal or Einstein's relativity theory.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Galilei, G. (1632) Dialogo sopra i due massimi sistemi del mondo [Dialogues on Two World Systems]. (In Italian) https://web.archive.org/web/20070703014601/http://archimedes.mpiwg-berlin.mpg.de/cgi-bin/toc/toc.cgi?step=thumb&dir=galil_syste_065_en_1661

[2] Newton, I. (1687) Philosophiae Naturalis Principia Mathematica. Jussu Societatis Regiae ac Typis Josephi Streater, 88. https://doi.org/10.5479/sil.52126.39088015628399

[3] Einstein, A. (1905) Zur Elektrodynamik bewegter Körper. *Annalen der Physik*, **322**, 891-921. https://doi.org/10.1002/andp.19053221004

[4] Einstein, A. (1905) Ist die Trägheit eines Körpers von seinem Energieinhalt abhängig? *Annalen der Physik*, **323**, 639-641. https://doi.org/10.1002/andp.19053231314

[5] Einstein, A. (1916) Die Grundlage der allgemeinen Relativitätstheorie. *Annalen der Physik*, **354**, 769-822. https://doi.org/10.1002/andp.19163540702

[6] Michelson, A.A. and Morley, E.W. (1887) On the Relative Motion of the Earth and the Luminiferous Ether. *American Journal of Science*, **3**, 333-345. https://doi.org/10.2475/ajs.s3-34.203.333

[7] Asano, M., Khrennikov, A., Ohya, M., Tanaka, Y., and Yamato, I. (2015) Quantum Adaptivity in Biology: From Genetics to Cognition. Springer, 1-173.

[8] Ando, T., and Yamato, I. (2024) Relativity Theory by Einstein Revisited. Qeios ID: SHG4Y5. https://doi.org/10.32388/SHG4Y5

[9] Ando, T. and Yamato, I. (2024) Time/Space and Inertial System Reconsidered Based

on the Adaptive Dynamical View. *Journal of Modern Physics*, **15**, 1621-1631. https://doi.org/10.4236/jmp.2024.1511070

[10] Szostek, R. (2020) Derivation of All Linear Transformations That Meet the Results of Michelson-Morley's Experiment and Discussion of the Relativity Basics. *Moscow University Physics Bulletin*, **75**, 684-704. https://doi.org/10.3103/s0027134920060181

[11] Szostek, R. (2022) The Original Method of Deriving Transformations for Kinematics with a Universal Reference System. *Jurnal Fizik Malaysia*, **43**, 10244-10263.

[12] Ando, T., Asano, M., Khrennikov, A., Matsuoka, T. and Yamato, I. (2023) Adaptive Dynamics Simulation of Interference Phenomenon for Physical and Biological Systems. *Entropy*, **25**, Article 1487. https://doi.org/10.3390/e25111487

[13] Ando, T., Khrennikov, A. and Yamato, I. (2024) Refinement of Adaptive Dynamical Simulation of Quantum Mechanical Double Slit Interference Phenomenon. *Journal of Modern Physics*, **15**, 239-249. https://doi.org/10.4236/jmp.2024.153012

[14] Szostek, K. and Szostek, R. (2022) The Existence of a Universal Frame of Reference, in Which It Propagates Light, Is Still an Unresolved Problem of Physics. *Jordan Journal of Physics*, **15**, 457-467. https://doi.org/10.47011/15.5.3