The generalization of the special relativity theory

Sangwha-Yi

Department of Math , Taejon University 300-716

ABSTRACT

The theory is the general theory of the special relativity theory. You can consider that this theory treats the universe that can treat an inertial system. In this time, the light's velocity is $\frac{c}{\alpha_0}$ instead of c. In this theory, be able to consider that the light has the velocity $\frac{c}{\alpha_0}$ instead of c.

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e-mail address:sangwha1@**nate.com**

Tel:051-624-3953

I. Introduction

The article treats that it expands the special relativity theory. This theory is the theory that can treat an inertial system.

II. Additional chapter-I

The light's velocity of this theory is $\frac{c}{\alpha_0}$. In this theory, be able to consider that the light has the velocity $\frac{c}{\alpha_0}$.

$$t = \frac{\tau}{\sqrt{1-\alpha_0^{\ 2}\frac{u^2}{c^2}}} \qquad (1)$$

α_0 is the constant number.

In this theory,

$$d\tau^2 = dt^2(1-\alpha_0^{\ 2}\frac{u^2}{c^2}) = dt^2 - \alpha_0^{\ 2}\frac{1}{c^2}(dx^2+dy^2+dz^2)$$

$$= dt^2(1-\alpha_0^{\ 2}\frac{u^2}{c^2}) = dt^2 - \frac{1}{c^2}\alpha_0^{\ 2}(dx^2+dy^2+dz^2)$$

$$= dt'^2(1-\alpha_0^{\ 2}\frac{u'^2}{c^2}) = dt'^2 - \frac{1}{c^2}\alpha_0^{\ 2}(dx'^2+dy'^2+dz'^2) \qquad (2)$$

$$x = \frac{x'+v_0t'}{\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}}}, t = \frac{t'+\alpha_0^{\ 2}\frac{v_0}{c^2}x'}{\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}}}, x' = \frac{x-v_0t}{\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}}}, \ t' = \frac{t-\alpha_0^{\ 2}\frac{v_0}{c^2}x}{\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}}} \qquad (3)$$

$$y = y', z = z'$$

$$V = \frac{dx}{dt} = \frac{\frac{dx'}{dt'}+v_0}{1+\alpha_0^{\ 2}\frac{v_0}{c^2}\frac{dx'}{dt'}} = \frac{u+v_0}{1+\alpha_0^{\ 2}\frac{v_0}{c^2}u}, \quad u = \frac{dx'}{dt'} \qquad (4)$$

In the example, the light is

$$d\tau^2 = dt^2(1-\alpha_0^{\ 2}\frac{u^2}{c^2}) = dt^2 - \frac{1}{c^2}\alpha_0^{\ 2}(dx^2+dy^2+dz^2) = 0$$

$$cdt = \alpha_0 ds, \ ds = \sqrt{dx^2+dy^2+dz^2}, \frac{ds}{dt} = \frac{c}{\alpha_0}$$

$$d\tau^2 = dt'^2 - \frac{1}{c^2}\alpha_0^{\ 2}(dx'^2+dy'^2+dz'^2) = 0$$

$$cdt' = \alpha_0 ds', ds' = \sqrt{dx'^2 + dy'^2 + dz'^2}, \frac{ds'}{dt'} = \frac{c}{\alpha_0} \qquad (5)$$

The light's velocity of the this theory is $\frac{c}{\alpha_0}$

In this time, the mass m_0 is

$$m = \frac{m_0}{\sqrt{1 - \alpha_0^2 \frac{u^2}{c^2}}} \qquad (6)$$

$$m = \frac{E}{c^2} \alpha_0^2$$

III. Additional chapter-II

In this theory, the particle's the force definition and the kinetic energy definition, etc be similar the present special relativity theory's definition.

In this theory, the particle's the force F and the kinetic energy KE, the power P, the momentum p, the total energy E are

$$p^\alpha = m_0 \frac{dx^\alpha}{d\tau}$$

$$F = m_0 a = \frac{d}{dt}\left(\frac{m_0 u}{\sqrt{1 - \alpha_0^2 \frac{u^2}{c^2}}}\right) = \frac{dp}{dt}$$

$$KE = \int_0^u u d\left(\frac{m_0 u}{\sqrt{1 - \alpha_0^2 \frac{u^2}{c^2}}}\right) = \frac{m_0 c^2 / \alpha_0^2}{\sqrt{1 - \alpha_0^2 \frac{u^2}{c^2}}} - m_0 c^2 / \alpha_0^2 = E - m_0 c^2 / \alpha_0^2$$

$$P = \frac{d(KE)}{dt} = \frac{d}{dt}\left(\frac{m_0 c^2 / \alpha_0^2}{\sqrt{1 - \alpha_0^2 \frac{u^2}{c^2}}} - m_0 c^2 / \alpha_0^2\right) = F \cdot u = \frac{d}{dt}\left(\frac{m_0 u}{\sqrt{1 - \alpha_0^2 \frac{u^2}{c^2}}}\right) \cdot u \qquad (7)$$

And

$$E^2 = \frac{m_0^2 c^4 / \alpha_0^4}{1 - \alpha_0^2 \frac{u^2}{c^2}} = m_0^2 c^4 / \alpha_0^4 + p^2 c^2 / \alpha_0^2 = m_0^2 c^4 / \alpha_0^4 + \frac{m_0^2 u^2 c^2}{1 - \alpha_0^2 \frac{u^2}{c^2}}$$

$$= \frac{m_0^2 c^4 (1 - \alpha_0^2 \frac{u^2}{c^2}) \frac{1}{\alpha_0^4} + m_0^2 u^2 c^2 / \alpha_0^2}{1 - \alpha_0^2 \frac{u^2}{c^2}} = \frac{m_0^2 c^4 / \alpha_0^4}{1 - \alpha_0^2 \frac{u^2}{c^2}}$$

$$E' = \frac{m_0 c^2/\alpha_0^{\ 2}}{\sqrt{1-\alpha_0^{\ 2}\frac{u^2}{c^2}}} \quad , \quad p' = \frac{m_0 u}{\sqrt{1-\alpha_0^{\ 2}\frac{u^2}{c^2}}},$$

$$V = \frac{dx}{dt} = \frac{\frac{dx'}{dt'}+v_0}{1+\alpha_0^{\ 2}\frac{v_0}{c^2}\frac{dx'}{dt'}} = \frac{u+v_0}{1+\alpha_0^{\ 2}\frac{v_0}{c^2}u}, \quad u = \frac{dx'}{dt'}$$

$$E = \frac{m_0 c^2/\alpha_0^{\ 2}}{\sqrt{1-\alpha_0^{\ 2}\frac{V^2}{c^2}}} = \frac{m_0 c^2 (1+\alpha_0^{\ 2}\frac{v_0}{c^2}u)\frac{1}{\alpha_0^{\ 2}}}{\sqrt{1-\alpha_0^{\ 2}\frac{u^2}{c^2}}\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}}} = \frac{E'+v_0 p'}{\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}}}$$

$$, p = \frac{m_0 V}{\sqrt{1-\alpha_0^{\ 2}\frac{V^2}{c^2}}} = \frac{m_0(u+v_0)}{\sqrt{1-\alpha_0^{\ 2}\frac{u^2}{c^2}}\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}}} = \frac{p'+\frac{v_0}{c^2}\alpha_0^{\ 2}E'}{\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}}} \qquad (8)$$

If $a = a_0$,

$$a = a_0 = \frac{d}{dt}\left(\frac{u}{\sqrt{1-\alpha_0^{\ 2}\frac{u^2}{c^2}}}\right), \quad u = \frac{dx}{dt} = \frac{a_0 t}{\sqrt{1+\frac{\alpha_0^{\ 2}a_0^{\ 2}t^2}{c^2}}}$$

$$x = \frac{c^2}{a_0\alpha_0^{\ 2}}\left(\sqrt{1+\frac{\alpha_0^{\ 2}a_0^{\ 2}t^2}{c^2}}-1\right) \quad (9)$$

In this theory, the Maxwell-equation is

$$\left(\frac{\partial E_x}{\partial x}+\frac{\partial E_y}{\partial y}+\frac{\partial E_z}{\partial z}\right) = \vec{\nabla}\cdot\vec{E} = 4\pi\rho$$

$$\left[\left(\frac{\partial B_z}{\partial y}-\frac{\partial B_y}{\partial z}\right)i-\left(\frac{\partial B_z}{\partial x}-\frac{\partial B_x}{\partial z}\right)j+\left(\frac{\partial B_y}{\partial x}-\frac{\partial B_x}{\partial y}\right)k\right] = \vec{\nabla}\times\vec{B}$$

$$= \frac{1}{c/\alpha_0}\left[\left(\frac{\partial E_x}{\partial t}+4\pi j_x\right)i+\left(\frac{\partial E_y}{\partial t}+4\pi j_y\right)j+\left(\frac{\partial E_z}{\partial t}+4\pi j_z\right)k\right] = \frac{1}{c/\alpha_0}\left(\frac{\partial\vec{E}}{\partial t}+4\pi\vec{j}\right)$$

$$\left(\frac{\partial B_x}{\partial x}+\frac{\partial B_y}{\partial y}+\frac{\partial B_z}{\partial z}\right) = \vec{\nabla}\cdot\vec{B} = 0$$

$$\left[\left(\frac{\partial E_z}{\partial y}-\frac{\partial E_y}{\partial z}\right)i-\left(\frac{\partial E_z}{\partial x}-\frac{\partial E_x}{\partial z}\right)j+\left(\frac{\partial E_y}{\partial x}-\frac{\partial E_x}{\partial y}\right)k\right] = \vec{\nabla}\times\vec{E}$$

$$= -\frac{1}{c/\alpha_0}\left[\frac{\partial B_x}{\partial t}i+\frac{\partial B_y}{\partial t}j+\frac{\partial B_z}{\partial t}k\right] = -\frac{1}{c/\alpha_0}\frac{\partial\vec{B}}{\partial t} \qquad (10)$$

$$\vec{B}=\vec{\nabla}\times\vec{A} \quad ,\vec{E}=-\vec{\nabla}\phi-\frac{1}{c/\alpha_0}\frac{\partial\vec{A}}{\partial t} \qquad (11)$$

In this time, uses Lorentz gauge.

$$\frac{1}{c/\alpha_0}\frac{\partial\phi}{\partial t}+\vec{\nabla}\cdot\vec{A}=0 \text{ (Lorentz gauge)} \quad (12)$$

Therefore,

$$\left(\frac{1}{c^2/\alpha_0^{\ 2}}\frac{\partial^2}{\partial t^2}-\nabla^2\right)\phi=4\pi\rho \quad ,\left(\frac{1}{c^2/\alpha_0^{\ 2}}\frac{\partial^2}{\partial t^2}-\nabla^2\right)\vec{A}=\frac{4\pi}{c/\alpha_0}\vec{j} \quad (13)$$

The transformation of 4-vector operator $\left(\frac{1}{c/\alpha_0}\frac{\partial}{\partial t},\vec{\nabla}\right)$ is

$$\frac{1}{c/\alpha_0}\frac{\partial}{\partial t}=\gamma\left(\frac{1}{c/\alpha_0}\frac{\partial}{\partial t'}-\frac{v_0}{c/\alpha_0}\frac{\partial}{\partial x'}\right),\frac{\partial}{\partial x}=\gamma\left(\frac{\partial}{\partial x'}-\alpha_0\frac{v_0}{c}\frac{1}{c/\alpha_0}\frac{\partial}{\partial t'}\right)$$

$$\frac{\partial}{\partial y}=\frac{\partial}{\partial y'} \ , \ \frac{\partial}{\partial z}=\frac{\partial}{\partial z'} \ , \ \gamma=1/\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}} \qquad (14)$$

The transformation of the Electro-magnetic 4-vector potential $(\phi,\vec{A})$ is

$$\phi=\gamma(\phi'+\alpha_0\frac{v_0}{c}A_{x'}), \quad A_x=\gamma(A_{x'}+\alpha_0\frac{v_0}{c}\phi')$$

$$A_y=A_{y'} \ , \ A_z=A_{z'}, \quad \gamma=1/\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}} \qquad (15)$$

Therefore, the transformation of Electro-magnetic field $\vec{E},\vec{B}$ is

$$E_x=E_{x'},E_y=\gamma E_{y'}+\gamma\alpha_0\frac{v_0}{c}B_{z'}, \ E_z=\gamma E_{z'}-\gamma\alpha_0\frac{v_0}{c}B_{y'}$$

$$B_x=B_{x'},B_y=\gamma B_{y'}-\gamma\alpha_0\frac{v_0}{c}E_{z'}, \ B_z=\gamma B_{z'}+\gamma\alpha_0\frac{v_0}{c}E_{y'}$$

$$\gamma=1/\sqrt{1-\alpha_0^{\ 2}\frac{v_0^{\ 2}}{c^2}} \qquad (16)$$

In the quantum theory,

$$E=\frac{m_0c^2/\alpha_0^{\ 2}}{\sqrt{1-\alpha_0^{\ 2}\frac{u^2}{c^2}}}=h\upsilon \quad (17)$$

The Compton effects is

$$\lambda' - \lambda = \frac{h}{m_0 c / \alpha_0}(1 - \cos\phi) \quad (18)$$

The de Broglie wavelength λ is

$$\lambda = \frac{h}{p} = \frac{h}{mu} \ , \ m = \frac{m_0}{\sqrt{1 - \alpha_0{}^2 \frac{u^2}{c^2}}} \quad (19)$$

IV. Conclusion

In my private opinion, thinks that it is able to consider that applies this theory to the initial universe that can treat an inertial system.

If $\alpha = 1$, this theory does the present special relativity theory

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