The Special Relativity Theory and Energy

Tsuneaki Takahashi

Abstract

Considering Special Relativity Theory, energy has been derived through the case of mass points' collision applying the equation of the Theory.

Space dimension element and time dimension element have different value in different frame of references.

This makes finally relativistic mass which has also different value in different frame of references. And currently it is assumed that the change of relativistic mass creates energy.

Here the difference of relativistic mass is based on difference of view. But static energy should be real quantity and unique existence. So it should not be created from the change of view. So we should tried to derive static energy directly and deductively on the same assumption for the Theory.

1. Introduction

Applying the equation of the Special Relativity Theory, the mass points' collision case has following scenario [1].

Space dimension element depends on the frame of reference based on the Special Relativity Theory. (Space dimension element is different from projection of space distance. [2][3][4])

Time dimension element depends on the frame of reference based on the Special Relativity Theory. (Time dimension element is different from projection of time distance.)

On above, mass point velocity (u) depends on the frame of reference.

Then applying momentum conservation law, mass also depends on the frame of reference. This means mass m is function of velocity u.

$$\mathrm{m}_u = \frac{m_0}{\sqrt{1-\frac{u^2}{c^2}}}$$

Here change of the velocity u makes change of mass, then makes change of static energy.

But the static energy may be assumed real quantity and may not depend on the frame of reference. So considering the Special Relativity Theory, the energy should be tried to derive directly and deductively based on the same assumption for the Theory and assumptions in general.

2. Derivation of energy

On the Special Relativity Theory, space and time are equivalent dimensions, and time distance t is converted to ct as a space dimension.

Then a mass point is moving in space with velocity u and in time space with velocity c.

In the collision case, mass changes depending on the frame of reference. But in this case, change of mass is in one frame of reference, for example, nuclear fission.

Considering above and others, deviation of energy E is

$$\frac{\mathrm{dE}}{\mathrm{dt}} = \text{energy deviation on mass m change} + \text{work done on velocity change}$$

$$= \frac{1}{2}\frac{dm}{dt}(u^2 + c^2) + (um\frac{du}{dt} + cm\frac{dc}{dt})$$

$$= \frac{d}{dt}(\frac{1}{2}m(u^2 + c^2)) \quad (1)$$

Then total energy of mass point is

$$\mathrm{E} = \frac{1}{2}m(u^2 + c^2) \quad (2)$$

Here energy deviation based on mass change cannot be measured as work done because it changes to heat, light and other various energy.

3. Close examination

Total energy of mass point is (2)

So actually we can consider about the work the mass could do in each following cases.

a) Mass is never changing ($\frac{dm}{dt} = 0$).

On (2),

$$\frac{\mathrm{dE}}{\mathrm{dt}} = \frac{1}{2}\frac{dm}{dt}(u^2 + c^2) + um\frac{du}{dt} + cm\frac{dc}{dt} = um\frac{du}{dt} = \frac{1}{2}m\frac{d}{dt}u^2$$

(because c is constant.)

Then

$$\mathrm{E} = \frac{1}{2}mu^2$$

This means

work $\mathrm{W} = \frac{1}{2}mu^2$ can be done.

b) Mass can be changed ($\frac{dm}{dt} \neq 0$) and u$\neq 0$

On (2),

$$\frac{\mathrm{dE}}{\mathrm{dt}} = \frac{1}{2}\frac{dm}{dt}(u^2 + c^2) + um\frac{du}{dt} + cm\frac{dc}{dt} = \frac{1}{2}\frac{dm}{dt}(u^2 + c^2) + um\frac{du}{dt}$$

Then

work $\mathrm{W} = \frac{1}{2}mu^2 + \frac{1}{2}mc^2$ can be done.

c) Mass can be changed ($\frac{dm}{dt} \neq 0$) and u$= 0$

On (2),

$$\frac{\mathrm{dE}}{\mathrm{dt}} = \frac{1}{2}\frac{dm}{dt}(u^2 + c^2) + um\frac{du}{dt} + cm\frac{dc}{dt} = \frac{1}{2}\frac{dm}{dt}c^2$$

Then

work $\mathrm{W} = \frac{1}{2}mc^2$ can be done.

Velocity u is varied regarding to the frame of reference, then kinetic energy is varied regarding to frame of reference.

Relativistic mass m is varied regarding to the frame of reference. But static energy for real mass m is calculated in the frame of reference of the mass point because the energy is created from real mass change.

Reference

[1] Peter Gabriel Bergmann,*Introduction to the Theory of Relativity*, (Dover Publication, INC 1976),p85

[2] Tsuneaki Takahashi, viXra:1611.0077,(http://vixra.org/abs/1611.0077)

[3] Tsuneaki Takahashi, viXra:1604.0285,(http://vixra.org/abs/1604.0285)

[4] Tsuneaki Takahashi, viXra:1604.0328,(http://vixra.org/abs/1604.0328)