Acceleration and Deceleration Equations: The Dynamics of Matter-Light Transformation

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June 9, 2026

Abstract

English Abstract: Within the framework of the three-layer world model of absolute space, this paper presents the mathematical forms of the acceleration equation (matter energy → field energy) and the deceleration equation (field energy → matter energy). The ratio of the equivalent gravitational mass to the internal mass-energy is derived and compared with the Lorentz factor of relativity. The results show that the acceleration equation corresponds to two Lorentz transformations (γ^2), which reduces to the relativistic form after taking the square root; the deceleration equation corresponds to an inverse two-layer transformation ($1/(1+v^2/c^2)$) and is a new theoretical prediction. The asymmetry between the acceleration and deceleration equations is the fundamental cause of matter creation and the manifestation of interaction forces, providing a crucial experimental test to distinguish this theory from relativity.

Résumé

Résumé en français : Dans le cadre du modèle du monde à trois couches de l'espace absolu, cet article présente les formes mathématiques de l'équation d'accélération (énergie de matière → énergie de champ) et de l'équation de décélération (énergie de champ → énergie de matière). Le rapport de la masse gravitationnelle équivalente à l'énergie de masse interne est dérivé et comparé au facteur de Lorentz de la relativité. Les résultats montrent que l'équation d'accélération correspond à deux transformations de Lorentz (γ^2), qui se réduit à la forme relativiste après avoir pris la racine carrée ; l'équation de décélération correspond à une transformation inverse à deux couches ($1/(1+v^2/c^2)$) et constitue une nouvelle prédiction théorique. L'asymétrie entre les équations d'accélération et de décélération est la cause fondamentale de la création de matière et de la manifestation des forces d'interaction, fournissant un test expérimental crucial pour distinguer cette théorie de la relativité.

Keywords: acceleration equation; deceleration equation; three-layer world; Lorentz transformation; matter creation; decisive experiment; absolute space; field energy; mass-energy conversion; quantum transition

1 Definition of Physical Quantities

- m_0: intrinsic rest mass of an object (reference of the past world). - m: equivalent gravitational mass given by the acceleration or deceleration equation, representing the equivalent field-energy mass of the object. - $2m_0 - m$: internal mass-energy of the theory, representing the matter-energy part of the object.

The ratio $\frac{m}{2m_0-m}$ expresses the ratio of the equivalent field-energy mass to the internal mass-energy.

Note: There is no mutual attraction between masses; attraction arises from the interaction between field energies. This ratio is defined to align and compare with the mass relationship in Einstein's relativity. Relativity holds that when a particle is accelerated to the speed of light, its mass becomes infinite. In fact, it is not the mass itself that diverges, but the ratio of the particle's field-energy mass to its internal mass-energy becomes infinite. Hence, a particle can never reach the speed of light.

2 Acceleration Equation (Matter Energy → Field Energy)

The acceleration equation describes the forward two-layer transition of an object from the past world (gravitational world) to the future world (hadron world). It is given by Eq. (1):

$$m = \frac{m_0}{1 - \dfrac{v^2}{2c^2}} \tag{1}$$

The ratio is calculated from Eq. (1) as shown in Eq. (2):

$$\frac{m}{2m_0 - m} = \frac{1}{1 - v^2/c^2} = \gamma^2, \quad \gamma = \frac{1}{\sqrt{1 - v^2/c^2}} \tag{2}$$

When $v = c$, Eq. (1) gives $m = 2m_0$, and the internal mass-energy $2m_0 - m = 0$; all energy is converted into field energy (photon). The ratio in Eq. (2) corresponds to **two Lorentz transformations** (past → present → future). If it corresponded to only one Lorentz transformation, taking the square root of Eq. (2) yields $\gamma = 1/\sqrt{1 - v^2/c^2}$, which is consistent with the mass relation in Einstein's relativity.

3 Deceleration Equation (Field Energy → Matter Energy)

The deceleration equation describes the reverse two-layer transition of an object from the future world (hadron world) back to the past world (gravitational world). It is given by Eq. (3):

$$m = \frac{m_0}{1 + \dfrac{v^2}{2c^2}} \tag{3}$$

The ratio is calculated from Eq. (3) as shown in Eq. (4):

$$\frac{m}{2m_0 - m} = \frac{1}{1 + v^2/c^2} \tag{4}$$

When $v = c$, if deceleration begins from the speed of light, Eq. (3) requires an equivalent mass of $2m_0/3$, which necessitates a **quantum transition** (internal mass-energy jumps from 0 to $2m_0/3$). Taking the square root of Eq. (4) corresponds to reducing the two-layer inverse transition to a single effective transition, yielding Eq. (5):

$$\sqrt{\frac{m}{2m_0 - m}} = \frac{1}{\sqrt{1 + v^2/c^2}} \tag{5}$$

The form of Eq. (5) differs from the Lorentz factor $1/\sqrt{1 - v^2/c^2}$ in relativity, featuring a plus sign in the denominator instead of a minus sign.

4 Comparison with Relativity

Table 1 summarizes the comparison between this theory and relativity for different processes.

Table 1: Comparison between this theory and relativity

Theory	Process	Ratio $\frac{m}{2m_0-m}$	Square-root form (effective sing
Relativity	Relative motion between inertial frames	—	$\frac{1}{\sqrt{1-v^2/c^2}}$
This theory (acceleration)	Past $\rightarrow$ Future (forward two-layer)	$\frac{1}{1-v^2/c^2}$	$\frac{1}{\sqrt{1-v^2/c^2}}$
This theory (deceleration)	Future $\rightarrow$ Past (reverse two-layer)	$\frac{1}{1+v^2/c^2}$	$\frac{1}{\sqrt{1+v^2/c^2}}$

As shown in Table 1, the acceleration equation reduces to the relativistic form after taking the square root, so they are compatible; the deceleration equation is a new prediction that can be tested by high-energy particle deceleration experiments.

5 Asymmetry and Matter Creation

The acceleration equation (1) and the deceleration equation (3) are inherently asymmetric. It is precisely this asymmetry that allows light (or field) to exhibit mass (i.e., force) during its oscillation in an acceleration-deceleration cycle. If the two equations were completely symmetric, when high-speed particles collide in an accelerator, their vibration waves would not produce new matter; only elastic scattering would occur, and no transformation of energy into mass would be observed. Therefore, **the asymmetry of the acceleration-deceleration process is the fundamental cause of "matter creation" and the manifestation of "interaction forces" in the universe**. This theory reveals the internal dynamical mechanism for generating new particles in colliders. Although the acceleration-deceleration cycle described by Eqs. (1) and (3) leads to a net mass increase, particles (matter) have a finite lifetime,

so the total mass of the universe will not grow infinitely.

6 Conclusion

The acceleration equation (1) and the deceleration equation (3) together constitute a complete dynamical description of the mutual transformation between matter and light. The acceleration equation reduces to the relativistic form after taking the square root, so relativity can be regarded as a special case of this theory under a single Lorentz transformation. The deceleration equation is a new theoretical prediction and provides a decisive experimental test to distinguish this theory from relativity.

References

[1] Relevant chapters of this paper.

[2] Foundations of Special Relativity.