

Special Relativity Refutation through the Relativistic Doppler Effect Formula

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Abstract

The relativistic Doppler shift formula is shown to be based on a contradictory equation, revealing the unviability of the Special Relativity.

Keywords: Special Relativity, Relativistic Doppler shift.

1. Introduction

In his 1905 paper,¹ Einstein derived the Lorentz transformation equations for the space and time coordinates on the basis of the relativity principle and the constancy of the speed of light. Transformation equations for the electric and magnetic forces were then deduced from the Maxwell-Hertz and the former equations. The obtained electrodynamics transformations applied on the wave equations for light led to the general relativistic Doppler shift formula.

It follows that the coherence of the Doppler shift formula is vital for the Special Relativity veracity. In this communication, the Doppler shift is shown to merely result from a contradictory equation requiring that any relative motion velocity must be zero. Hence, the Special Relativity transformation equations leading to the relativistic Doppler formula must be unviable.

2. Relativistic Doppler Shift

In §3 of the cited paper,¹ the time transformation equation converting event time between two inertial frames in relative motion of velocity v , having the coordinate systems $K(x, y, z, t)$ and $k(\xi, \eta, \zeta, \tau)$ associated with what's considered as "stationary" and "moving" frame, respectively, is obtained as

$$\tau = \beta \left(t - \frac{vx}{c^2} \right), \quad (1)$$

where

$\beta = \left(\sqrt{1 - v^2 / c^2}\right)^{-1}$, and $c =$ speed of light in empty space.

In §7 of the same paper, a light (electrodynamics waves) source, with given wave characteristics, is considered in the stationary system at a sufficiently far distance from the origin. The characteristics of these waves were to be determined when observed from the moving frame. We quote the following passage:

From the equation for ω' it follows that if an observer is moving with velocity v relatively to an infinitely distant source of light of frequency ν , in such a way that the connecting line "source-observer" makes the angle ϕ with the velocity of the observer referred to a system of co-ordinates which is at rest relatively to the source of light, the frequency ν' of the light perceived by the observer is given by the equation

$$\nu' = \nu \frac{1 - \cos \phi \cdot v / c}{\sqrt{1 - v^2 / c^2}}. \quad (2)$$

This is Doppler's principle for any velocities whatever. When $\phi = 0$ the equation assumes the perspicuous form

$$\frac{\nu'}{\nu} = \frac{\sqrt{1 - v / c}}{\sqrt{1 + v / c}}. \quad (3)$$

Relativistic Doppler Shift Formula Contradiction

Let's consider the case for $\phi = 0$. According to the classical velocity addition, the light wave emitted from the stationary system K would be traveling with respect to the moving observer at a velocity of $c + v$. Whereas, according to the Special Relativity's constancy of the speed of light principle, the wave velocity would be c relative to the moving observer's system k . Let's suppose that this principle shall lead to the following contradiction

$$c + v = c \quad (4)$$

Let the wave period be given by t in the source frame, and the period measured in the traveling observer's frame by τ . According to the basic wave characteristics, we have $\tau\nu' = t\nu = 1$. Therefore, Eq. (4) can be rewritten as

$$(c + v)\tau\nu' = ct\nu; \quad (5)$$

$$\tau = t \frac{c}{c + v} \cdot \frac{\nu}{\nu'}.$$

Using Eq. (3) in the above equation, we get

$$\tau = t \frac{1}{1 + v/c} \cdot \frac{\sqrt{1 + v/c}}{\sqrt{1 - v/c}};$$

$$\tau = t \frac{1}{\sqrt{1 - v^2/c^2}}; \quad (6)$$

which is in line with Eq. (1) for $x = 0$ (source is at origin of K), thus satisfying the time dilation prediction of the Special Relativity.

It follows that the contradictory Eq. (4) leads to the Special Relativity time dilation Eq.(6), through the application of the relativistic Doppler shift formula given by Eq. (3).

Conversely, Eq. (5) is a legitimate Special Relativity equation, since it leads to its time dilation equation. However, this same equation yields the contradictory Eq. (4).

Based on the above, the Special Relativity is deemed to be unviable.

3. Conclusion

When the relativistic Doppler shift equation, derived from the Special Relativity transformation equations, is used in a proposed contradictory equation, it leads to the Special Relativity prediction of the time dilation, which demonstrates the unviability of the Special Relativity.

References

- 1 A. Einstein, "Zur elektrodynamik bewegter Körper," *Annalen der Physik* **322** (10), 891–921 (1905).