SPECIAL RELATIVITY WITH ABSOLUTE SPACE AND TIME

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In special relativity, this article presents kinematic quantities that are invariant under Lorentz transformations.

Introduction

From an auxiliary point object (called free-point) can be obtained kinematic quantities (such as absolute position, absolute time, etc.) that are invariant under Lorentz transformations.

The free-point is a point object (massive particle) that must always be free of internal and external forces (or the net force acting on it must always be zero)

The absolute position $(\breve{x}_i, \, \breve{y}_i, \, \breve{z}_i)$ and the absolute time $(\breve{t}_i)$ of a particle i relative to an inertial reference frame S are given by:

$$\breve{x}_i \doteq \frac{x_i - V_x \, t_i}{\sqrt{1 - \frac{V_x^2}{c^2}}} \quad , \quad \breve{y}_i \doteq y_i \quad , \quad \breve{z}_i \doteq z_i$$

$$\breve{t}_i \doteq \frac{t_i - \frac{V_x \, x_i}{c^2}}{\sqrt{1 - \frac{V_x^2}{c^2}}}$$

where $(x_i, \, y_i, \, z_i, \, t_i)$ are the position and the time of the particle i relative to the inertial reference frame S, (V_x) is the velocity (on the x axis) of the free-point relative to the inertial reference frame S and (c) is the speed of light in vacuum.

Observations

In this article, the kinematic quantities $(\breve{x},\, \breve{y},\, \breve{z},\, \breve{t}\,)$ are always invariant under Lorentz transformations.

From these quantities, it would be possible to obtain the absolute position $\breve{\mathbf{r}}$, the absolute velocity $\breve{\mathbf{v}}$ and the absolute acceleration $\breve{\mathbf{a}}$ of a particle (with rest mass m_o) relative to an inertial reference frame S.

The linear momentum $\mathbf{P}$, the force $\mathbf{F}$, the work W and the kinetic energy K, for the inertial reference frame S, would be given by:

$$\mathbf{P} \doteq \frac{m_o\, \breve{\mathbf{v}}}{\sqrt{1 - \dfrac{\breve{v}^2}{c^2}}}$$

$$\mathbf{F} = \frac{d\mathbf{P}}{d\breve{t}}$$

$$\mathrm{W} \doteq \int_1^2 \mathbf{F} \cdot d\breve{\mathbf{r}} = \Delta\, \mathrm{K}$$

$$\mathrm{K} \doteq m_o\, c^2 \left(\frac{1}{\sqrt{1 - \dfrac{\breve{v}^2}{c^2}}} - 1 \right)$$

According to this article, the quantities $(\,\breve{\mathbf{r}},\, \breve{\mathbf{v}},\, \breve{\mathbf{a}},\, \mathbf{P},\, \mathbf{F},\, \mathrm{W},\, \mathrm{K}\,)$ would also be invariant under Lorentz transformations.

However, this article considers, on one hand, that it would also be possible to obtain kinematic and dynamic quantities $(\,\breve{\mathbf{r}},\, \breve{\mathbf{v}},\, \breve{\mathbf{a}},\, \mathbf{P},\, \mathbf{F},\, \mathrm{W},\, \mathrm{K}\,)$ that would be invariant under transformations between inertial and non-inertial reference frames and, on the other hand, that the dynamic quantities $(\,\mathbf{P},\, \mathbf{F},\, \mathrm{W},\, \mathrm{K}\,)$ would also be given by the above equations.