The Egocentricity of Special Relativity

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(July 16, 2019)

Abstract

This paper assumes the existence of a fabric of space that is locally Euclidean with a preferred coordinate system. These assumptions are shown to produce the special relativity transformations for two bodies in colinear motion. Of primary importance is the insight gained into the transformations of special relativity. There is an observational error factor and an actual component factor for each transformation.

Purpose

This papers allows one to view the fabric of space as being a structure that supports a preferred coordinate system. Special relativity is shown to be consistent with this view. The inability to detect when an observer is stationary in the structure of space does not prevent a stationary structure from existing.

Special relativity allows an egocentric view for all observers. This can mislead one into believing special relativity precludes a stationary structure of space. It is important to realize that a stationary structure may be considered when one contemplates the fabric of space.

The Michelson-Morley (M-M) experiment is considered by some to support rejection of an aether based preferred coordinate system consistent with Euclidean geometry. It seems that the M-M null results must occur if the apparatus used for the experiment if the physical apparatus is held together electromagnetically and as such undergoes the same changes as the light waves being examined.

Real Versus Observational Transforms

Assume two observers, A and B, are moving through a preferred coordinate system with velocities u and v. Using the addition rule for relative velocity differences between A and B produces the following :

$$w = \frac{v - u}{1 - u\,v\,/\,c^2} \tag{1}$$

The Special Relativistic transformation using velocity w :

$$\gamma\,(w) = \frac{1}{\sqrt{1 - w^2\,/\,c^2}} \tag{2}$$

Substituting Equation (1) into Equation (2) and simplifying, gives :

$$\gamma\,(w) = \frac{c^2 - u\,v}{\sqrt{c^2 - u^2}\quad\sqrt{c^2 - v^2}} \tag{3}$$

Equation (3) is symmetrical in u and v as expected from a relativistic view. The task remains to determine what part of the special relativity transformation is real and what part is observational. If we adopt the view that a preferred coordinate system exists, it follows that we need to adjust measurements to compensate for our motion in that preferred coordinate system.

If a body is at rest in the assumed preferred coordinate system, then there are no observational errors from the failure to consider motion of the observer. All of the special relativity transformation is real. We can use the inverse of the special relativity transformation to backward reference a body in motion to one without motion. This inversely transformed relationship can then transformed into a different body in motion.

The Lorentz contraction forms the real portion of the transformations between body A and body B. This occurs because a body is held together electromagnetically at some level. Thus, a body and its distance measuring device contract in order to maintain the same electromagnetic equilibrium they had while at rest.

The real component of the transformation of body B observed by body A :

$$\frac{\sqrt{c^2 - u^2}}{\sqrt{c^2 - v^2}} \tag{4}$$

The real component of the transformation of body A observed by body B :

$$\frac{\sqrt{c^2 - v^2}}{\sqrt{c^2 - u^2}} \tag{5}$$

Dividing Equation (3) by Equation (4) gives the observational component of the transformation of body B observed by body A :

$$\frac{c^2 - u\,v}{c^2 - u^2} \tag{6}$$

Dividing Equation (3) by Equation (5) gives the observational component of the transformation of body A observed by body B :

$$\frac{c^2 - u\,v}{c^2 - v^2} \tag{7}$$

Equation (6) or Equation (7) reduces to 1 if u or v, respectively, equals zero.

Combine Equation (4), real factor; and Equation (6), observational factor, giving A's view of B:

$$\gamma(w) = \underbrace{\left[\frac{\sqrt{c^2-u^2}}{\sqrt{c^2-v^2}}\right]}_{\text{Real}} \underbrace{\left[\frac{c^2-u\,v}{c^2-u^2}\right]}_{\text{Observational}} \tag{8}$$

or, relativistically viewed:

$$\gamma(w) = \frac{c^2-u\,v}{\sqrt{c^2-u^2}\;\sqrt{c^2-v^2}} \tag{9}$$

Combine Equation (5), real factor; and Equation (7), observational factor, giving B's view of A:

$$\gamma(w) = \underbrace{\left[\frac{\sqrt{c^2-v^2}}{\sqrt{c^2-u^2}}\right]}_{\text{Real}} \underbrace{\left[\frac{c^2-u\,v}{c^2-v^2}\right]}_{\text{Observational}} \tag{10}$$

or, relativistically viewed:

$$\gamma(w) = \frac{c^2-u\,v}{\sqrt{c^2-u^2}\;\sqrt{c^2-v^2}} \tag{11}$$