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Letter to the Editor

Incompatibility of FitzGerald-Lorentz Contraction and Time Dilation

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LETTER TO THE EDITOR:

This is a third in the series [1, 2] of Letters which prove that the Lorentz Transformation (LT) [3] is invalid. It deals with the case of a train in which a measurement of the speed of light is carried out. A light pulse is passed along a metal bar of length L m on the train as it passes the station platform with speed v. The elapsed time for the light pulse to travel between the ends of the bar is T'=L/c s, in verification of the accepted value of c ms^{-1}=299792458 ms^{-1} for the speed of light in free space.

The purpose of the LT is to predict the corresponding values of the distance traveled by the light and the elapsed time from the vantage point of a stationary observer located on the platform. According to the FLC,[3] this distance will depend on the orientation of the metal bar relative to the direction in which train is moving. If it is perpendicular to this direction, the value of the length will be the same (L) as measured on the train, but it will be contracted by a factor of $\gamma(v)=(1-v^2/c^2)^{-0.5}$ if it is parallel to this direction. The speed of the light pulse must be the same independent of the orientation of the metal bar according the LT. The corresponding elapsed time measured on the platform is predicted by the LT to be greater than measured on the train because of the effects of time dilation there, specifically also by the same γ (v) factor.

The speed of light in each case is determined as the ratio of the distance travelled to the corresponding elapsed time. If the metal bar is oriented in a perpendicular direction, the ratio predicted by the LT is $L/\gamma(v)T' = c/\gamma(v) < c$, in disagreement with the LT equal light-speed condition. The discrepancy is even larger for the case of the parallel oriented bar, namely $(L/\gamma)/\gamma T'=c/\gamma^2(v)$. The unequivocal conclusion from this exercise is therefore that the LT is not capable of giving correct predictions in this standard application and is therefore invalid.

The Uniform Scaling method [4] deals with such an application by assuming that the rates of the clocks on the train and platform have a fixed ratio (Q). Accordingly, the elapsed time T' measured on the train corresponds to a value of QT' on the station platform. It is convenient to look upon Q as a *conversion factor* between the different times for the same event in the two rest frames. Since the speed of light is the same for observers in both rest frames, it follows that the unit of speed is the same for both, i.e. the conversion factor in this case is unity (or Q^0). In order for that to be the case on a completely general basis, it is necessary that the conversion factor for distances is exactly the same as for elapsed times, i.e. also Q. This means that the corresponding value for the length of the metal bar is QL, independent of the orientation of the bar. The speed of the light pulse in the rest frame of the platform is therefore equal to the ratio QL/QT'=L/T'=c for all orientations of the metal bar, as desired.

It is important to generalize the above argument for light speeds as much as possible. This is done [4], for example, by changing Einstein's postulate (LSP) [5] so that it requires that the speed of light relative to its source is always equal to c. This would include looking upon the mirrors in the Michelson-Morley experiment [6] as light sources, for example. The Galilean Relativity Principle (RP) also demands[4] that there is agreement in different rest frames on the *relative speeds* of any two objects. Otherwise, one could distinguish between two inertial frames on the basis of their different measured ratios of a given relative speed to that of a light pulse. The revised light-speed postulate also makes clear that the velocity of light relative to two rest frames in relative motion to one another cannot be the same [7]. More details about

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the LT and its failure to accurately predict the results of numerous applications may be found in another publication of the present journal [8].

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