General relativity of EM fields; source-observer relative acceleration affects the speed of light! This mi..i..ght explain the results of the 'time delay' experiments?!

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Abstract

The new theory of (Special) Relativity of Electromagnetic Fields proposed earlier is based on the assumption that the observer and the source are in uniform relative speed and is based on the 'postulate' of absolute constancy of the speed of light. It was disappointing at first when I discovered that the theory implied a variation of the speed of light with the acceleration of an observer relative to the source. Later I found out that this variation to be vitally important as it might explain the results of the well known 'time delay' experiments claimed as evidences supporting Einstein's relativity! Perhaps the variation of the speed of light with source-observer relative acceleration might explain 'GPS correction', Ives-Stilwell experiment and Hafele and Keating Experiment! There is a common factor in all these experiments: acceleration. However, the new theory of General Relativity of EM waves should be completed quantitatively to know its real significance. The purpose of this paper is only to announce the new theory by presenting a briefly and preliminarily; the details and more accurate quantitative analysis will be presented in future versions of this paper.

Introduction

The new theory of Relativity of EM Fields [1] proposed earlier is based on the assumption that the observer is in uniform speed relative to the source. It is based on the postulate of constant light speed. However, the theory implies that the speed of light varies if there is relative acceleration between the source and the observer. This was disappointing at first because the original theory of (Special) Relativity of EM Fields was based on the constancy of the speed of light. However, it turned out to be of vital importance later on because, perhaps, this might explain the results of some of those well known experiments that are claimed as evidences to confirm Einstein's special and general relativity.

In the next section, the new theory of General Relativity of EM fields will be presented preliminarily.

Discussion

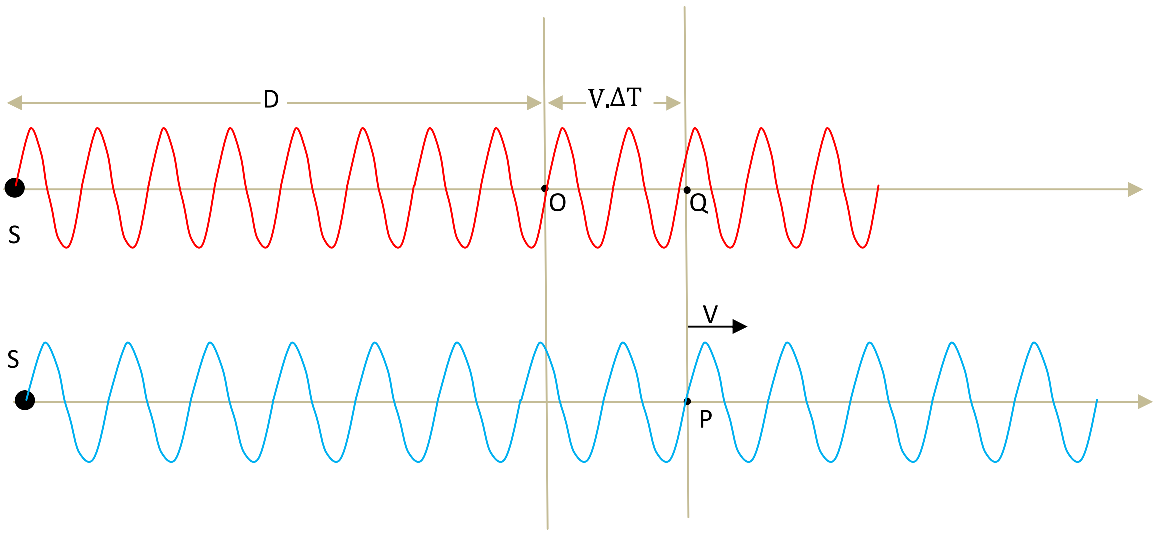

Fig.1

Suppose that observer O is at point O, stationary relative to light source S , and that observer P is moving to the right with velocity V.
According to the previously proposed (Special) Relativity of EM Fields [1], both observers observe the same corresponding points on 'their' respective' waves.
Now, let us see what happens if observer P stops suddenly, within zero time, at point P. What would he observe now?!
This was the start of a series of reasonings that led to the theory being proposed in this paper : the General Theory of Relativity of EM waves.

Just before he/she stopped, he observed the blue wave. But, just after stopping instantaneously, he observed the red wave, at the same point P because the deceleration from velocity V to zero took place instantaneously.
Just before stopping, the number of complete wave cycles to the right and left of both O and P was equal, 5 and 8 respectively.
Just after stopping, observer P observes what observer Q is observing. But the number of cycles to the right of Q is just less than 3 (say 2.75). Therefore, the number of wave cycles to the right of observer P has reduced from 5 (just before stopping) to 2.75 (just after stopping). Therefore, we conclude that 2.25 wave cycles (which is 5 minus 2.75) have crossed past observer P, from right to left, with in zero time. Therefore, the wave travelled back to the left past observer P with infinite speed. Normally, when an

observer moves with constant relative speed relative to the source, the wave travels past the observer P, from left to right. In this case, however, the wave makes no progress past observer P during zero time. What frequency would observer P detect? Infinite, because 2.25 cycles per zero seconds.
In the above discussion we assumed infinite deceleration of observer P (from velocity V to zero velocity within zero time) just to simplify the discussion. In reality, accelerations/decelerations are finite.

From the above discussion, we can see that the deceleration of observer P causes the EM field to get compressed back to its source. This is why 2.25 cycles moved past observer P (to the left) during the zero deceleration time.
Therefore, for finite decelerations also the wave gets compressed back to the source. (for an observer moving away from the source; the same basic method must be used to analyse for all other cases: a combination of acceleration/deceleration with towards/away from the source).

Thus, during the deceleration two phenomena take place
1. The normal travel of the light wave past the observer, to the right and
2. The compression of the field towards the source.
Now, if we consider a point on the wave (say a peak point), its velocity will be determined by the resultant effect of the above two phenomena: the normal travel of the light wave past observer P with speed C (to the right) and the compression of the EM field back to its source, moving back that point (to the left).

At some value of deceleration, the speed of that point relative to the observer becomes zero! The wave just stands still as observed by observer P.

Thus, for deceleration values greater than this critical value, the resultant effect of the two phenomena is that the wave moves from right to left, past the observer P (back to its source), as observed by observer P.

The above cases are only theoretical because I guess it is impractical to attain the magnitude of decelerations required for such a case to arise. (However, this conclusion is only a guess and will be checked in the quantitative analysis, which will be presented in the next version of this paper).

For deceleration values less than this critical value, which is the practical case, the resultant effect is that the wave moves from left to the right past observer P (the familiar case, away from the source). In this case, the direction of the wave travel is away from the source, and the effect of deceleration of observer is just to decrease the speed of the light wave (to less than C).

An analogy of this (Relativity of EM fields) is to consider an ant travelling on an elastic string, fixed at the left end (Fig.2) and an observer observing the ant.

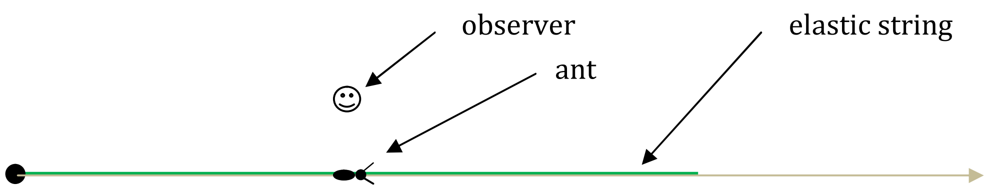

Fig.2

Suppose that the elastic string shown is in an extended state. Suppose that the ant is travelling to the right on the string. What should the observer do so as to keep the ant just in front of him all the time, despite its movement to the right on the elastic string? The obvious solution is to continuously shorten the string at a rate that keeps the ant just front of the observer.
If the ant travels too fast, it will more than compensate for its backward movement due to the compression of the string and thus its resultant velocity relative to the observer will be towards the right. If it travels too slow, its resultant velocity will be towards the left. At some speed of the ant, its resultant velocity relative to the observer will be zero. In the above analogy, the elastic string is analogous to EM field and the ant is analogous to the EM wave travelling 'on' the EM field.

The discussion so far is just meant to provide some intuitive description of the theory. In the next section, quantitative analysis will be introduced.

Suppose that at an instant of time t stationary observer O is at point O and another observer P at point P is moving to the right with velocity V at this instant of time. According to the (Special)Theory of Relativity of EM waves, observer O and observer P observe the same corresponding points on 'their' respective waves, with $D = V.\Delta t = V.(x\text{-}D)/C$, where Δt is the time it takes for the light wave to travel from the source to point O. Suppose that observer P starts to decelerate at this instant of time with value equal to a.

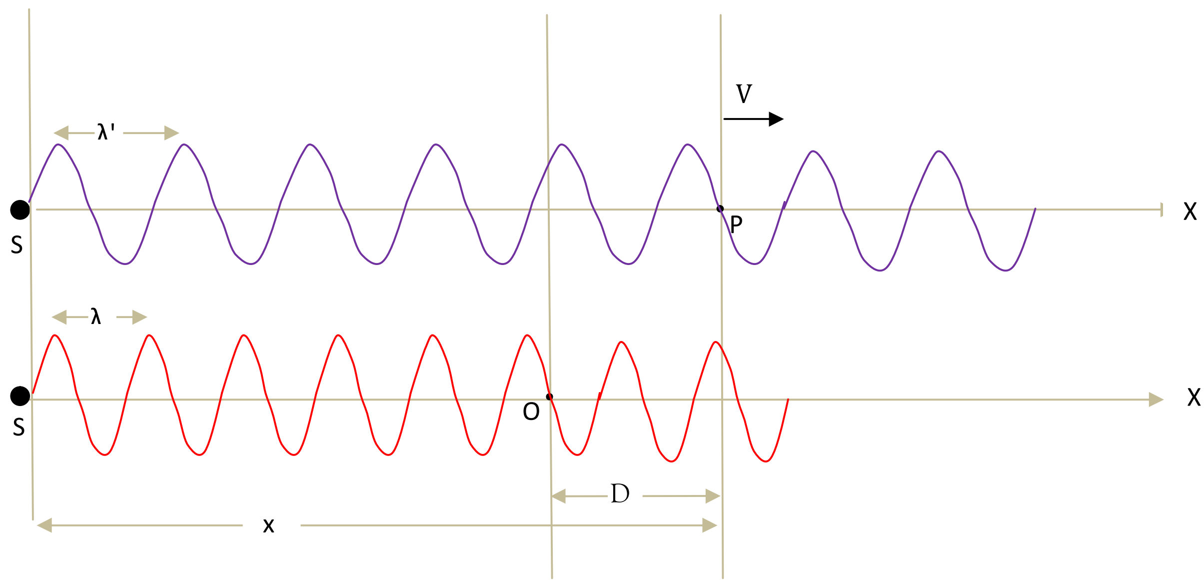

Fig.1

Now we have to determine the speed of the wave, at distance *x*.

From, $D = V.\left(\frac{x-D}{c}\right)$ $we\ get\ D = \left(\frac{V}{C+V}\right).x$

We have three variables : d , $V\,and\,x$.
It follows that,

$$\frac{dD}{dt} = x\,.\,\frac{\partial}{\partial t}\left(\frac{V}{C+V}\right) + \frac{\partial x}{\partial t}.\left(\frac{V}{C+V}\right)$$

$$\frac{dD}{dt} = x.\left(\frac{dV}{dt}\right).\left(\frac{C}{(C+V)^2}\right) + \left(\frac{V}{C+V}\right).\frac{dx}{dt}$$

but $\frac{dx}{dt} = V$ and $\frac{dV}{dt} = a$

Thus,

$$\frac{dD}{dt} = x.a.\left(\frac{C}{(C+V)^2}\right) + \left(\frac{V}{C+V}\right).V$$

To determine the speed of the EM (light) wave relative to the observer, we first determine frequency and wavelength.

$$f' = \frac{C - \left(\frac{dD}{dt}\right)}{\lambda}$$

where λ is the wave length of the wave observed by the stationary observer O and f' is the frequency of the wave as observed by decelerating observer P.

To determine λ',
we have already discussed that, at any instant of time, the number of wave cycles to the right and to the left of observer O is always equal to the number of wave cycles to the right and left of observer P respectively.
From it follows that,

$$\frac{x - D}{\lambda} = \frac{x}{\lambda'}$$

we determine λ' as:

$$\lambda' = \lambda . \left(\frac{x}{x - D}\right)$$

Now we determine the speed of the light wave relative to the decelerating observer to be:

$$C'' = f'.\lambda'$$

f' and λ' are to be substituted from the previous equations

Conclusion

The theory of Relativity of EM Fields/Waves, which is based on sound logical reasoning and observations, predicts that, for an observer accelerating relative to a light source, the speed of light varies from C. In this paper, an intuitive analysis and description has been presented. Also a preliminary quantitative analysis has been presented. The variation of the speed of light with the acceleration of the observer relative to the source might explain the results of some of the well known experiments that are claimed to support Einstein's special and general relativity theories. A complete and more detail and accurate analysis will be presented in the next version of this paper. The quantitative analysis presented here is just to introduce the method of analysis, and is not complete.

References

1. http://vixra.org/pdf/1302.0065v3.pdf