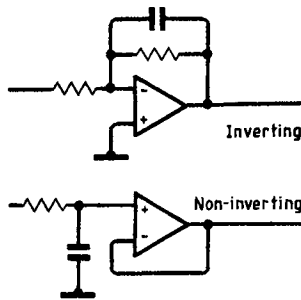


FEEDBACK

a squarer) its output will increase continuously until the amplifier limits.

What is required in the application is a leaky integrator, or averager, with a finite integration time constant of several times the period of the lowest frequency to be handled. I illustrate two suitable circuits:



Joules Watt's text seems to realise this – but the circuit he uses to illustrate the text does not perform the function he describes.

James M. Bryant
European Applications Manager
Analog Devices

Relativity

The explanation M. H. Butterfield ('Feedback', February 1987) asks for concerning flashes of light and the derivation of the Lorentz transformations is given in the reference I quoted in the October 1986 'Feedback'. Surely observations on flashes of light amount to experimental evidence?

Many writers on relativity have claimed that what de Sitter asserted – that the absence of the splitting of spectrum lines of binary stars is in agreement with Einstein's invariance postulate – is the best direct evidence that exists for the postulate. Since such splitting is in fact observed, where does that leave the postulate? Again, if Butterfield wants to understand the point better, let him look up the reference I quoted.

Prof. R. A. Waldron
University of Ulster

I think my old friend Alan Watson must have been teasing when he said that in the timekeeping equation for terrestrial clocks the "acceleration-potential" (CTR) term and the Lorentz-velocity (STR) term are

identical, so that only one of them is required! (*Feedback*, April 1987).

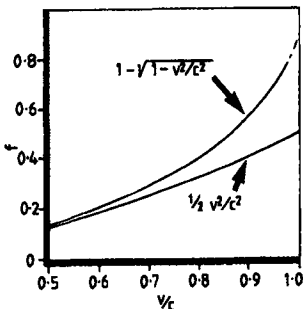
Mr Watson correctly derives the former term in his letter, showing it to provide the proportional slowing

$$(\Delta t/t)_a = \frac{1}{2}v^2/c^2 \text{ (exactly).}$$

where $v = \Omega R$. On the other hand, according to Einstein himself¹ the time-dilation term is

$$(\Delta t/t)_v = 1 - \sqrt{1 - v^2/c^2},$$

which is not the same thing at all. Their difference becomes pronounced when they are plotted for $v \geq \frac{1}{2}c$, as in the diagram.



At low velocities, of course, $\frac{1}{2}v^2/c^2$ is a good approximation to $(\Delta t/t)_v$; but the whole point of the relativity theory is that it is said to predict the correct answers even when $v \rightarrow c$. The terms differ by over 50% at $v = 0.95c$, so that it would seem wrong to assert their identity. The same problem arises, and the same mistake is regularly made, when discussing the well-known ultracentrifuge experiment (Mossbauer effect).

In the context of the clocks discussion I might add that experimental evidence seems to exist, to the effect that ideal clocks on the earth's surface do not "keep the same relativistic time independently of latitude differences" (to quote Hafele & Keating). Dr Harold Aspden was kind enough to draw my attention to two interesting papers by the Italian time specialists Briatore and Leschiutta,² whose results may take quite a lot of explaining away. Watch this space!

In the same (April) *Feedback*, H. Pursey of New Malden takes your correspondent Lee Coe (January 1987) to task, for "not being aware of the relativistic doppler effect, the theory of which may be found in any undergraduate

physics textbook". I believe Mr Pursey may have missed the point.

Mr Coe had explained carefully that the radar echo from a moving target (car) travelled at velocity c relative to that car, and also (according to relativity theory) at the same time at velocity c relative to the stationary police vehicle. Anti-relativists, he said, would not agree: rightly or wrongly, they would probably suggest its velocity was $c + v$.

The point would seem to be this. Mr Coe quoted from the *Scientific American* article on the new Stanford accelerator, which said

"... the accelerating [electromagnetic] field must travel at a velocity close to that of the particles. Some slippage between the two is allowable, so long as the particles stay near the wave-crests."

Here the particles are claimed to be travelling at the velocity $0.999999997c$ relative to the accelerator, so the wave velocity must be slowed down slightly to match it. The engineers have built a 'slow-wave' structure to make this happen; it is a standard waveguide technique.

But now: what is the velocity of this wave (a light wave) relative to the particles? (It needs to be substantially zero, so that the particles can as it were surfboard along on the waves, continuously gaining energy from them.) But, like the velocity of that radar wave, c relative to both the moving car and the stationary car, should it not be (very nearly) c relative to the particles in this case also? How do the particles differ from moving motor cars, according to relativity theory? And if the wave velocity is c relative to the particles, how can "the particles stay near the wave-crests" – and how does this big accelerator work, please?

Mr Coe's point is a little deeper than is normally "found in any undergraduate physics textbook". It is one of those which are not willingly discussed by relativists at any level.

W. A. Scott Murray
Kippford
Galloway

1. Einstein, A. On the Electrodynamics of Moving Bodies; trans. in *The Principle of Relativity*. Methuen, 1923, Dover, 1952. p.49.

2. Briatore, L and Leschiutta, S.

Verifying the gravitational shift due to the earth's rotation: *Lettere al Nuovo Cimento*, vol. 15, 1976 pp. 203-207 (In English), Correction: vol. 17, 1976 p.328.

In the Feb. issue Prof Butterfield states "It is not helpful to look for every opportunity to knock the theory that provides an explanation without any vetige of something to replace it".

Having 'knocked' the theory and provided an alternative based on the sound rule of *no presupposition*, I invite Prof Butterfield to read the subscribed references and provide a reasoned refutation, again without presupposition. If refutation is not possible then will he admit that Einstein dropped a clanger?

Alex Jones
Alderney

Letters from Alex Jones:

Twins paradox, *Wireless World*, May 1982.

E. M. Doppler, *Wireless World*, November 1983.

Light, distance and time. *Electronic & Wireless World*, September 1985.

Multi element transform

Pull the other one! "Multi to single element transform", my Aunt Gertie, God rest her. What J. C. Belcher's article boils down to might be summarised as:

- * Integration of inverse-square vectors over two or three dimensions is difficult
- * his transform is easier
- * but it is just complex enough that until you read the article you don't see
- * that it gives the wrong results (his words are "comes into dispute with contemporary theory").
- * so he is going to go on using it anyway.

Nowhere is the faintest effort made to justify use of the so-called "transform". I suppose we should not be surprised: any such attempt would reveal that the article is a candy-floss of nonsense though I failed to find in the name of the author or in the title of the article any anagrams of, for instance, April Fool. Bearing in mind the price of the generally excellent magazine, I would nevertheless appreciate if next year you used less valuable space on jokery.

Alex D. Wilding
Redditch