

Re: GPS corrections

Source: <http://sci.tech--archive.net/Archive/sci.physics.relativity/2005-12/msg01875.html>

- *From:* "Koobee Wublee" <kublai@xxxxxxx>
 - *Date:* Wed, 21 Dec 2005 21:46:55 -0800
-

"Tom Roberts" <tjroberts@xxxxxxxxxxx> wrote in message
[news:42qgf.35029\\$7h7.25766@xx](news:42qgf.35029$7h7.25766@xx)
> Koobee Wublee wrote:
>> "Dirk Van de moortel" <dirkvandemoortel@xx>
>> wrote in message [news:L8cqf.78001\\$t2.5051463@xx](news:L8cqf.78001$t2.5051463@xx)
>>> Look at
>>> <http://www.eftaylor.com/pub/projecta.pdf>
>>
>> Taylor's derivation above violates the principle of special relativity.
>
> I have no idea why you think that is relevant. GR itself does not obey
> that principle -- GR has a far more general principle: general covariance.

Apparently, you have not read and understood Taylor's paper on GPS.

> [The principle of special relativity says in effect that the
> laws of physics do not depend upon one's choice of inertial
> frame; GR has no such dependence on inertial frames, and
> its principle is that the laws of physics do not depend
> on any choice of coordinates.]

Well, you can do better than that. To disprove my statement above, you have to show me what I have not already known and understood. You have to show Neil Ashby's attempt to derive GPS time dilation is as nutty as I am.

>> GR demands only one equation to explain GPS. Neil Ashby realized this.
>> However, he had to perform two fancy metric transformations without any
>> concrete justification.
>
> I have no idea what you are trying to say. "metric transformations" are
> freely available in GR, and one needs no "justification" for them other
> than it seems convenient to apply them. This is because general covariance
> applies, and the underlying laws of physics do not depend on coordinates
> in any way.

Not only you have not read and understood Taylor's paper, you have not done so with Dr. Ashby.

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>> The bottom line is that GR has trouble to explain GPS.

>

> Nonsense.

Just because you can cut out blocks of what GR has to offer to justify the result of your observation, it does not mean you have solved the problem using the laws of GR. What laws you may ask?

>> GR's matching result to GPS is taken from the term $(-U)$ (see below)

>> without any proper consideration to do so.

>

> Sure there is "proper consideration" -- the steps you discuss are part of
> an approximation to the equations of GR. An approximation that is more
> than accurate enough in this situation.

To be as picky as you are, I have to correct what you just said. The approximation is just adequate for the accuracy involve not more then adequate as you seem to think.

>> $\sqrt{g_{00}} = \sqrt{1 - 2U} = 1 - U - U^2 / 2...$

>> Where

>> $U = G M / c^2 / r$

>> To liberally use the term $(-U)$ to explain the result of GPS is like

>> cutting words out of a newspaper to compose a sentence. It does not

>> prove that GR explains the result of GPS.

>> The $(-U)$ is what is backwards compatible with Newtonian physics.

>>> [... Rest of handwaving nonsense snipped]

>

> Your writing does not even rise to the level of handwaving. What are you
> actually trying to say?

If you do not remember Schwarzschild's metric, please go back and review them.

> Note you are free to apply the equations of GR to the GPS. As, for
> instance, its designers have done.

Not I. You can fudge what GR has to offer and pretend you have solved the problem of GPS. As I said before, you can freely utilize the $(-U)$ terms of the satellites and on the ground together as well as the speed terms of the satellites and the ground. Taylor's derivation violates the principle of Special Relativity and thus General Relativity. Neil Ashby's derivation is better.

>> Any post-Newtonian theories with Newtonian result as limit should also be

>> able to explain GPS as well. GR is not special.

>

> Sure, in some ways "GR is not special", and there are many other theories

> of gravitation that explain the GPS as well as GR does. So what?

That is why GR is not any special than others. You are free to beat this

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point to death. <shrug>

> But GR is indeed "special" in that it is the simplest possible theory that
> is both coordinate free and accounts for all the relevant experimental
> observations to date.

I guess "specialness" is in the eyes of the beholder not just "beauty".

> [Yes, it's scary to say GR is "the simplest theory"....
> But indeed, it is its simplicity that permitted Einstein
> (and Hilbert) to discover it.]

Yes, that is the danger of falling in love with a theory. After that, you are drowned in the passion of love. There is no more logical consideration even after evidences do point towards the contrary. It is so true that "love is color blind".

• *Follow-Ups:*

- ◆ *Re: GPS corrections*
◇ *From:* Dirk Van de moortel

• *References:*

- ◆ *GPS corrections*
◇ *From:* Hauke Reddmann
- ◆ *Re: GPS corrections*
◇ *From:* Dirk Van de moortel
- ◆ *Re: GPS corrections*
◇ *From:* Koobee Wublee
- ◆ *Re: GPS corrections*
◇ *From:* Tom Roberts

- Prev by Date: *Re: On the "contraction" of a rod in SR*
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