Re: Pioneer 10 test of light speed delay

Source: http://sci.tech−archive.net/Archive/sci.astro/2004−11/1192.html

---

From: r9ns (*r9ns_at_verizon.net*)
Date: 11/20/04

Date: 20 Nov 2004 09:59:28 −0800

"George Dishman" <george.dishman@clara.co.uk> wrote in message
news:<1100553890.11437.0@damia.uk.clara.net>...
> "r9ns" <r9ns@verizon.net> wrote in message
>

<snip>
> > according to 1)the conventional model
> > and 2)its initial launch velocity etc. and the projection of this on
> > the earthsite to craft line is, through a nearly zero angle, 13.059.
>
> That is incorrect, according to the conventional
> model, the angle is about 11 degrees. However, we
> aren't discussing the conventional model. Show how
> we are to calculate this angle in your "easier"
> method.
>
The maximal angle between lines from Pluto at 40AU to the earth and to the sun is 1.4 deg not 11 deg.

> > Subtracting 13.059 from K1V1
>
> Your term "K1V1" is undefined and doesn't make
> any sense to me.
V1 is the earthsite velocity in equatorial coordinates with the sun at center and the x axis to the vernal equinox and the y axis perp to equatorial plane extended to the celestial sphere. K1 is the cos of the angle through which the velocity is projected on to the craft site line so as to give the observed received frequencies.

> I will hazard a guess that "c" refers to the
> speed of light.
>
> You have not explained where this equation comes
> from. Show your derivation.
>
> Show how you derive that equation.

<snip>
>
> *Show the specific values you obtain with sufficient*
> *instructions for me to reproduce those results.*
>
<snip>

> *Show how you did this and the results you obtained.*
> *Exactly what are the RA and Decl for these dates?*
>
You are confusing azimuth and elevation which are changing and RA and Decl which are not.

> > *This value of K1 so determined and the value given by the*
> > *conventional model for the craft sun distance, r1=6,295 116 208 gives*
>
> *Sorry, this is your model so the craft distance*
> *obtained by measuring the light propagation time*
> *is hardly relevant. Show how you derived that*
> *figure using your "easier" method.*
>
This is an initial estimate for the craft sun distance, r1=6,295 116 208 which is not going to be too far off from the esimate based on the initial launch speed etc and the conventional model. This estimate and the velocity estimate can be changed to be consistent with the received frequencies and the Newtonian trajectory.
I thought you might have some clever constructive ideas on how to do this.

> *I can't be bothered pointing out any more of this*
> *rubbish Ralph.*

Here is the method again where I have tried to clarify some of the steps which you had trouble with. Again I would hope that you might have some clever ideas on a numerical analysis procedure for refining the estimates of craft velocity and craft−earthsite distance given the constraints of the received frequencies and the assumed earthsite motions at transmission and reception and the previous velocity and the acceleration toward the sun etc.

The following data from Oct 7 1987 is from
http://mysite.verizon.net/r9ns/rangerate2.xls
:
GMT
Time DnCnFr R freq Hz V km/s r
K_____degrees__
21:27 810154 2292133984 30.03149 6295116208
0.848293063 32.86
21:28 810166 2292133972 30.03246 6295116975 0.848239147
…….
22:43 811249 2292132889 30.09136 629517453 0.844225255

22:44 811266 229213287 30.09194 629517529 0.844172955

sun wrt madrid
21:27 −144900464 −33758507 −14642492.86
21:28 −144900005 −33760109 −14643178.98
21:29 −144899545 −33761710 −14643865.1

22:41 −144866180 −33877102 −14693260 30.0901764
22:42 −144865713 −33878705 −14693945.96 30.0907706
22:43 −144865245 −33880309 −14694631.92 30.0913591

Note: I have put the Horizons ephemeris recorded value of V at 22:44 in the GMT time slot above for 22:43etc., for the following reason: The frequencies are recorded at times at the Greenwhich meridian (GMT=UTC as used in the UK) and the earthsite positions and velocities are recorded at Coordinate times, CT, where CT − UTC = Delta (thus CT= Delta + UTC) Horizons can output the Delta for the above expressions as
quantity #30 on the Observer tables; eg, For Oct 7,1987 at 21:23 (UTC),
it is 55.182341 seconds according to (Jon Giorgini,Senior Engineer Solar System Dynamics Group Jet Propulsion Laboratory)

To see that the Anderson et al claim of anomalous acceleration could also be due to the fact that light speed does not extrapolate to distances where the time is beyond a few seconds, do the following simple calculation with your data from Madrid and Canberra:

1) Solve for K1 given V1=earthsite velocity wrt sun
(T)(1+2(K1V1−13.059)/c=R1, so ((R1−T)c+2T(13.059))/2V1T=K1
The arccos of K1 is the angle between, V1, the velocity of the earth site wrt the sun and the line to the craft from the receiver site at this time. 13.059 is an initial estimate of craft velocity wrt the sun and the earth, T and R1 are the transmission and reception frequencies at this time.

2)from Aldebaran RA=4h36min = 360*4.6/23.9344=69.19deg.and DEC=16.51deg
calculate unit vector from earthsite toward Aldebaran in Taurus as indicative of the general direction of the craft without assuming a specific tractory but based presumably on previous data showing angle of strongest reception, data not in later eg 1987, 88 etc archived frequency records.
Converting from spherical to Cartesian coord we obtain, rsin(90−DEC)cos(RA),rsin(90−DEC)sin(RA),rcos(RA) where r=1
An lo and behold the dot product of this unit vector and the unit vector of the Madrid velocity wrt sun at this time is about .81 versus K1=.84 see data from Oct 7 1987
,http://mysite.verizon.net/r9ns/rangerate2.xls

3)Determine from (2)which of the lines implied by angle arccos(K1) pass within the constellation Taurus. Then if it is possible to produce a trajectory, based on our initial or modified estimate of craft velocity and distance and on Newtonian calculations of successive positions of the craft given the gravitational force of the sun and the previous position and velocity, that gives the received frequency again and again to within 1Hz, then we have shown that the anomalous acceleration is not needed and that the light speed delay does not exceed a few seconds no matter what the source−receiver distance.

When we compare the variation in the predictive accuracy of the NASA ephemeris over this period of time with that of this nearly instantaneous model we can see that nearly instantaneous model is more accurate. And we have no reason to expect a change in this difference between the accuracies of the two sets of predicted frequencies.

email r9ns@verizon.net