About the Wang Eclipse, Part 4

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This article is a response to an article by William Stubbs [1] and another article by Robert Kemp [2] both sent to NPA in 2013. Both articles are commenting on the Wang eclipse [3] observed in China in 1997. The interpretation given here is very different from [1] and [2]. It is demonstrated that a 300 year old theory can explain the observed anomaly. Modern theories cannot do that.

1. Background

During 2012 this author wrote 3 one page articles [4] [5] [6] to NPA about the Wang eclipse. Since Stubbs and Kemp have not commented on these contributions I regard it to be my duty to comment on their contributions. Since my contributions are very different from theirs the difference should be discussed. Sending papers to NPA is meaningful only if the articles lead to discussions. Since this is my fourth article about the subject I think that it is about time for someone to give a real review now.

2. About Stubbs' Method

In [1] a very good work is done to carefully retrieve data that are in a very good agreement to Wang's diagrams. It has also been demonstrated very convincingly that the noise free model of tidal gravity is very well approximated by a polynomial. However, the later use of these noisy data can be doubtful from at least 3 aspects:

- The data from 2 very *short* intervals of only 90 minutes are used to interpolate over a very *long* interval of about 180 minutes.
- 2 negative bumps in the registration are situated just in the ends of interior sides of the 2 90 minute's intervals. These negative bumps have the effect that the interpolation in the 180 minutes interval becomes far too low.
- The data are noisy. Therefore I conclude that the interpolation is not reliable.

These 3 facts together have the effect that the interpolations are not reliable. They are probably too low. Another problem is that the 8 minutes delay cannot be logically derived from only 2 points in the noisy background. Another question is why the registration is not symmetrical. The gravity in the beginning and in the end of the eclipse appears to be different. It is therefore the opinion of this author that we cannot conclude that the model for tidal gravity predicts a positive bump in gravity. Instead the 2 negative bumps in the registration represent the *real* anomaly. Stubb's work can provoke discussion and is therefore of interest.

3. An alternative interpretation

The Moon is producing a gravitational shadow covering a region of about 1/4 of the diameter of the Earth. This effect is penetrating our planet. The effect can probably change the form of our planet in the order of about 1 m. Since the shielding effect in the gravimeter equals the effect on nearby parts of our planet we cannot observe any effect during the eclipse. The gravimeter mass and the mass of nearby parts of our planet are 2 free falling bodies in relation to Sun and Moon. The connecting spring can therefore not detect any change. However, interaction between different parts of our planet has the effect that the shielding effect on our planet extends over a somewhat larger region than the effect on the gravimeter mass. This fact makes detection possible and explains why we get 2 negative bumps instead of one positive bump. It is therefore a great mistake to disregard the shielding effect on our planet and only focus on the gravimeter mass.

According to the interpretation given here the 2 negative bumps *represent the anomaly*. This idea has been communicated 3 times to NPA. Stubbs states nevertheless that *no credible answer has been offered*. He also states that the gravitational tide model *has problems* in the beginning and in the end of the eclipse. We must therefore conclude that it is bad interpolation during the 180 minutes interval that has produced the *illusion* that the gravitational tide model can predict a positive bump.

We must also remember that the optical image of our sun is produced on the *surface* of our sun at a distance of 8 light minutes. The shielding effect is produced *inside* our moon at a distance of only about 1 light second. An indication of an 8 minutes delay can therefore confirm light speed but cannot tell us anything about the speed of gravity. An evaluation of the 8 minutes delay is presented in Fig 1. This diagram is from Wang's

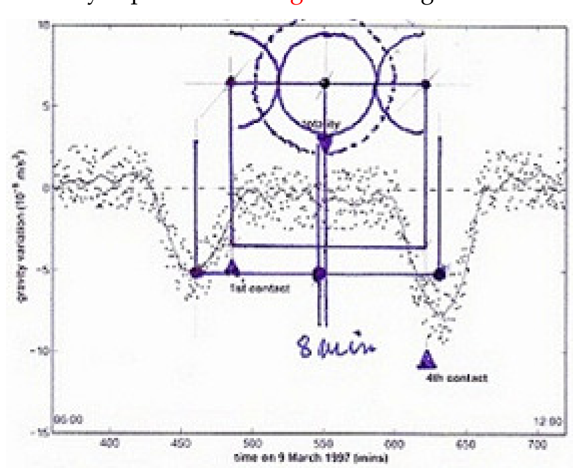

Fig 1 describes measurements of the total eclipse of the Sun on 9 March 1997. The solid curve is the averaged variation over a moving 10-minute window. The Moon's and Sun's positions are marked by hand drawing for the beginning and end of the optical eclipse. The diagram is from Wang's report.

report and has earlier been presented in [6] and also with some more detail in [7]. The symmetry in the registration means that we can estimate the delay to be about 8 minutes in the optical image. We can conclude that the anomaly is 2 negative bumps and that the gravitational tide model is correct and does not predict a positive bump. This result cannot help us to discriminate between Newton and Einstein. Instead the result can help us to discriminate between gravity of today and the Fatio and Le Sage model.

4. About Kemp's ideas

I agree to the idea from Kemp that is far more important that we can detect gravitational shielding than to measure the speed of gravity. I do not agree to the idea that we can decide between Newton and Einstein.

5. Shielding of gravity

A very rough estimation of the magnitude of the shielding effect has been done in [7]. The calculation gave a value of the same order of magnitude as observed by Wang. Since the shielding effect is acting on only parts of our planet the derivation of the effect is not easy. Effects during eclipses have been detected earlier by Allais. This fact together with Wang's results makes gravity shielding a very hot subject. More experiments of the Wang type should be done, since this indicates that present theory of gravity is only an approximation to a 300 year old model. For a homogenous sphere Newton predicts gravity on the surface proportional to radius. Fatio predicts an exponential function approaching a constant value for very large bodies. However, for bodies as small as our planet, the difference between these two predictions is very small. According to [7] the shielding effect is much smaller than Majorana's observations. However, the idea of apparent mass is correct.

If shielding of gravity is real it seems most probable that shielding also *produces* gravity. In other words: Fatio's theory is more plausible than Majorana's ideas. If shielding produces a *small* exponential decrease in a flow of particles we can do an approximation: $e^{-\alpha}\approx(1-\alpha)$. During a solar or lunar eclipse the flow of particles in a specific direction is changed from $1-(\alpha+\beta)$ to $(1-\alpha)(1-\beta)=1-(\alpha+\beta)+\alpha\beta$. The change, $\alpha\beta$, is of second order and very *small*. The change is predicted by Fatio but not by Newton. A hypothesis described in [7] implies a shielding constant 10^{-3} to 10^{-2} times Majorana's constant and also for a solar eclipse a value on $\Delta g/g$ between 10^{-9} and 10^{-8}. For a lunar eclipse we get an increased distance to the Moon of only about 10^{-6} produced over a time period of several hours. This effect can probably be detected by precision laser ranging during a lunar eclipse, if the effect is real. A solar eclipse, seen from a GPS satellite would also be detectable, as pointed out by Corry. The range to the satellite should probably increase about 10^{-4} during a time in the order of 1 hour.

6. Conclusions

The positive bump in Stubb's analysis is only an illusion produced by the fact that 2 negative bumps disturb the interpolation. These 2 bumps are the real anomalies. These 2 bumps are explained by the fact that interaction between different parts of our planet causes the shielding effect on our planet to extend over a greater range than the effect on the gravimeter mass.

More Wang type experiments should be done. A 300 year old theory predicts the anomaly observed by Wang. Modern theories of gravity cannot do that.

Since we have assumed that shielding can produce a small force inside the gravimeter mass we must assume that the same effect is produced inside parts of our planet. Therefore we must conclude no effect in the middle of the total eclipse.

It should also be possible to detect gravity shielding by means of laser ranging during a lunar eclipse, although the effect is small

References

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[4] John-Erik Persson, "About the Wang Eclipse", Proceedings of the NPA 2012

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[7] John-Erik Persson, "The Falling Ether", Proceedings of the NPA 2013

Reference [1] is available at:
www.worldsci.org/people/william_stubbs
Reference [2] is available at:
www.worldsci.org/people/robert_kemp
References [4] to [7] are available at:
www.worldsci.org/people/john-erik_persson