232(6): The Analytical Function Generated by Matching EGR to a Precessing Ellipse

This function is found by deducing the form of x needed to match the equation of a precessing ellipse:

$$\frac{d^2u}{d\theta^2} + x^2\left(u - \frac{1}{\alpha}\right) = 0 \quad -(1)$$

to the equation of Einsteinian general relativity:

$$\frac{d^2u}{d\theta^2} + u - \frac{1}{\alpha} = \delta u^2 \quad -(2)$$

Under these conditions:

$$\frac{1}{r} - \frac{1}{\alpha} - \frac{\delta}{r^2} = x^2\left(\frac{1}{r} - \frac{1}{\alpha}\right) -(3)$$

where

$$u = \frac{1}{r} \quad -(4)$$

so

$$x^2 = \underline{1} - \frac{\delta}{r^2}\left(\frac{1}{r} - \frac{1}{\alpha}\right)^{-1} -(4)$$

i.e

$$\boxed{x^2 = 1 - \frac{\delta}{r}\left(1 - \frac{r}{\alpha}\right)^{-1}} -(5)$$

and

$$\frac{1}{r} = \frac{1}{\alpha}\left(1 + \epsilon\cos(x\theta)\right) -(6)$$

for eq. (1).

2) So if eq. (2) is to give a precessing ellipse as claimed by EGR, its solution must be:

$$\frac{1}{r} = \frac{1}{\alpha}\left(1 + \epsilon \cos\left(\left(1 - \frac{\delta}{r}\left(1 - \frac{r}{\alpha}\right)^{-1}\right)^{1/2}\theta\right)\right) \quad -(7)$$

Clearly, this is not a precessing ellipse of type (6). This immediately refutes EGR, QED.

To make this point clearer, eqs. (6) and (7) can be inverted analytically to give θ as a function of r. From eq. (6):

$$\theta = \frac{1}{x}\cos^{-1}\left(\frac{1}{\epsilon}\left(\frac{\alpha}{r} - 1\right)\right), \quad -(8)$$

$$x = \text{constant} \quad -(9)$$

From eq. (7):

$$\theta = \left(1 - \frac{\delta}{r\left(1 - \frac{r}{\alpha}\right)}\right)^{-1}\cos^{-1}\left(\frac{1}{\epsilon}\left(\frac{\alpha}{r} - 1\right)\right) \quad -(10)$$

Plots of θ versus r can be made for eqs. (9) and (10) and obviously will

3) not be the same in general.

The reason why EGR gives the illusion that it is applied is that a precessing ellipse is the solar system, where x is essentially unity, and deviates by an extremely tiny amount from unity.

For earth for example:

$$\delta = 443.1 \text{ metres}, \quad -(11)$$

$$r_{max} = 1.52098232 \times 10^{12} \text{ m} \quad -(12)$$

$$r_{min} = 1.47098290 \times 10^{12} \text{ m} \quad -(13)$$

$$\epsilon = 0.0167123 \quad -(14)$$

$$d = (1+\epsilon) r_{min} = (1-\epsilon) r_{max}$$

$$= 1.495648 \times 10^{12} \text{ m} \quad -(15)$$

$$r_{mean} = \frac{1}{2}\left(r_{max} + r_{min}\right)$$

$$= 1.49598261 \times 10^{12} \text{ m} \quad -(16)$$

Therefore in eq. (5):

$$1 - x^2 = \frac{\delta}{r\left(1 - \frac{r}{d}\right)} \sim \text{order } 10^{-10} \quad -(17)$$

and under these conditions, eq. (10) approaches eq. (8), the equation of the true precessing ellipse. Analytically, eq. (10) is never the equation of the true precessing ellipse, as shown in note 232(5).

The phenomenon of precession in the solar system can be understood straightforwardly with eq. (1). The phenomena of light deflection due to gravitation can also be understood straightforwardly with eq. (1).

In contrast, function (10) is very complicated in general, and not well behaved. For example there is a singularity in eq. (5):

$$x^2 \to -\infty \text{ when } r = \alpha \quad (18)$$

which comes from forcing an incorrect eq. (2) to give the correct eq. (1).

<u>Plotting Exercise</u>

Compare the true eq. (8) with the false or forced, eq. (10) for all δ, ϵ and α.