2(?) . Further tests of the Einstein Theory in 2D and 3D

The EGR lagrangian is:

$$\mathcal{L} = \frac{1}{2} m \underline{\dot{r}} \cdot \underline{\dot{r}} + \frac{mMG}{|\underline{r}|} + \frac{MGL^2}{mc^2 |\underline{r}|^3} \quad -(1)$$

$$= \frac{1}{2} m \underline{\dot{r}} \cdot \underline{\dot{r}} + \frac{mMG}{(\underline{r} \cdot \underline{r})^{1/2}} + \frac{MGL^2}{mc^2 (\underline{r} \cdot \underline{r})^{3/2}},$$

which is true for any coordinate system and in two or three dimensions.

If the proper Lagrange variable is chosen to be $\underline{r}$, then:

$$\frac{\partial \mathcal{L}}{\partial \underline{r}} = \frac{d}{dt} \frac{\partial \mathcal{L}}{\partial \underline{\dot{r}}} \quad -(2)$$

which gives:

$$m \underline{\ddot{r}} = - mMG \frac{\underline{r}}{r^3} - \frac{3MGL^2}{mc^2} \frac{\underline{r}}{r^5} \quad -(3)$$

i.e.

$$\boxed{\underline{g} = \underline{\ddot{r}} = - MG \frac{\underline{r}}{r^3} - \frac{3MGL^2}{m^2c^2} \frac{\underline{r}}{r^5}} \quad -(4)$$

For comparison, the same method for ECE2 theory gives

$$\boxed{\underline{g} = \underline{\ddot{r}} = - \frac{MG}{r^3} \frac{\underline{r}}{r^3}} \quad -(5)$$

Eq. (5) gives retrograde precession. Both eqns. (4) and (5) apply in 2D or 3D and in any —

coordinate system.

The numerical method used to solve eq. (5) for the orbit in previous UFT papers can now be used for eq. (4).

It is known that eq. (4) is equivalent to the Binet equation in plane polar coordinates:

$$\frac{d^2 u}{d\phi^2} + u = \frac{1}{\alpha} + \frac{3MG}{c^2} u^2 \quad -(6)$$

where

$$u = \frac{1}{r} \quad -(7)$$

and

$$\alpha = \frac{L^2}{m^2 MG} \quad -(8)$$

and in UFT 391, Eq. (6) was shown to fail catastrophically. Therefore eq. (4) should also fail catastrophically when tested over a sufficient range of orbital conditions. It should fail in 2D and 3D and in any coordinate system. It is very important to display the failure graphically so that the Einstein theory can be refuted completely.

The ECE2 eq. (5) on the other hand does not fail and produces retrograde precession. Eq. (5) can be used in 2D and 3D and in any coordinate system.

Two Dimensional Cartesian

Eq. (4) gives:

$$\ddot{X} = -MG\left(\frac{X}{(X^2+Y^2)^{3/2}} + \frac{3L^2}{m^2c^2}\frac{X}{(X^2+Y^2)^{5/2}}\right) \quad -(9)$$

$$\ddot{Y} = -\frac{mGY}{(X^2+Y^2)^{3/2}}\left(1+\frac{3L^2}{m^2c^2(X^2+Y^2)}\right) \quad -(10)$$

The relativistic correction in Eqs. (9) and (10) is:

$$\Delta(\text{rel}) = \frac{3L^2}{m^2c^2(X^2+Y^2)} \quad -(11)$$

and is maximized for:

$$\frac{L^2}{(X^2+Y^2)} \gg m^2c^2 \quad -(12)$$

Eqs. (9) and (10) can be integrated numerically with Maxima to give the EGR orbit. The same type of catastrophic failure should be observed as shown by Eq. (6). Eqs. (9) and (10) can also be tested to see if they give retrograde precession or forward precession.

Three Dimensional Cartesian

Eq. (4) gives three simultaneous equations:

$$\ddot{X} = -\frac{mGX}{(X^2+Y^2+Z^2)^{3/2}}\left(1+\frac{3L^2}{m^2c^2(X^2+Y^2+Z^2)}\right) \quad -(13)$$

$$\ddot{Y} = -\frac{mGY}{(X^2+Y^2+Z^2)^{3/2}}\left(1+\frac{3L^2}{m^2c^2(X^2+Y^2+Z^2)}\right) \quad -(14)$$

$$\ddot{Z} = -\frac{mGZ}{(X^2+Y^2+Z^2)^{3/2}}\left(1+\frac{3L^2}{m^2c^2(X^2+Y^2+Z^2)}\right) \quad -(15)$$

The relativistic correction is maximized for:

$$3L^2 \gg m c^2 (X^2 + Y^2 + Z^2) \quad -(16)$$

the three dimensional orbit should fold dramatically into 3-D.
under the condition (16), and can be plotted in

Two Dimensional Plane Polar Coordinates (r, ϕ)

In this case:

$$\underline{r} = r\, \underline{e}_r \quad -(17)$$

and

$$\ddot{\underline{r}} = (\ddot{r} - r\dot{\phi}^2)\, \underline{e}_r + (r\ddot{\phi} + 2\dot{r}\dot{\phi})\, \underline{e}_\phi \quad -(18)$$

in which:

$$(\ddot{r} - r\dot{\phi}^2)\, \underline{e}_r = \frac{d^2 r}{dt^2}\, \underline{e}_r + \underline{\omega} \times (\underline{\omega} \times \underline{r}) \quad -(19)$$

and:

$$(r\dot{\phi} + 2\dot{r}\dot{\phi})\, \underline{e}_\phi = \frac{d\underline{\omega}}{dt} \times \underline{r} + 2\underline{\omega} \times \dot{\underline{r}} \quad -(20)$$

as in "Principles of ECE" volume one.

It follows that:

$$\ddot{r} - r\dot{\phi}^2 = -\frac{mG}{r^2}\left(1 + \frac{3L^2}{m^2 c^2 r^2}\right) \quad -(21)$$

which is the EGR correction to the Leibnitz equation.

The relativistic correction is:

$$\Delta = \frac{3L^2}{m^2 c^2 r^2} \quad -(22)$$

It also follows that:

$$r\ddot{\phi} + 2\dot{r}\dot{\phi} = 0 \quad -(23)$$

) Eqs. (21) and (23) follow from eq. (4), in which
[the] proper Lagrange variable is chosen to be $\underline{r}$, and
[the] Euler Lagrange equation is chosen to be eq. (2).
[In] plane polar coordinates:

$$\underline{r} = r\,\underline{e}_r \quad -(24)$$

[a]nd

$$\underline{\dot{r}} = \dot{r}\,\underline{e}_r + \dot{\phi}\, r\,\underline{e}_\phi \quad -(25)$$

in "Principles of ECE".

Using the numerical methods developed in the
[U]FT series of papers and books, eqs. (21) and (23)
[a]re solved simultaneously for the orbit $r(\phi)$. This
[o]rbit should fail catastrophically for $\Delta \gg 1$.
It can also be checked whether eqs. (21) and
(23) give retrograde precession.

If the proper Lagrange variables are chosen to be
[r] and ϕ there are two Euler Lagrange equations:

$$\frac{\partial \mathcal{L}}{\partial r} = \frac{d}{dt}\frac{\partial \mathcal{L}}{\partial \dot{r}} \quad -(26)$$

[a]nd

$$\frac{\partial \mathcal{L}}{\partial \phi} = \frac{d}{dt}\frac{\partial \mathcal{L}}{\partial \dot{\phi}} \quad -(27)$$

[a]nd

$$\mathcal{L} = \frac{1}{2}m\left(\dot{r}^2 + \dot{\phi}^2 r^2\right) + \frac{mMG}{r}\left(1 + \frac{L^2}{m^2c^2r^2}\right) \quad -(28)$$

Eq. (27) gives:

$$\frac{dL}{dt} = 0 \quad -(29)$$

where

$$L = mr^2\dot{\phi} \quad - (30)$$

is the angular momentum, a constant of motion.

Eq. (21) gives:

$$m\ddot{r} = m\dot{\phi}^2 r - \frac{mMG}{r^2} - \frac{3MGL^2}{mc^2r^4} \quad - (31)$$

i.e.

$$\ddot{r} = \dot{\phi}^2 r - \frac{MG}{r^2}\left(1 + \frac{3L^2}{m^2c^2r^2}\right) \quad - (32)$$

Eqs (21) and (32) are the same, Q.E.D.

From eqs. (30) and (32):

$$\ddot{r} = \frac{L^2}{m^2r^3} - \frac{MG}{r^2}\left(1 + \frac{3L^2}{m^2c^2r^2}\right) \quad - (33)$$

which is the EGR corrected Leibnitz equation.

Note carefully that eq. (2) in plane polar coordinates has the advantage of giving eq. (23):

$$r\ddot{\phi} + 2\dot{r}\dot{\phi} = 0 \quad - (34)$$

Eqs. (33) and (34) can be integrated simultaneously to give the orbit $r(\phi)$. Under the condition $\Delta \gg 1$ this should fail drastically.

Finally, the problem of solving eq. (1) for the orbit can also be solved using X, Y and Z as the new Lagrange variables. This will be described in the next note.