1) Notes 108(4): Circular Orbits in ECE Theory

These are described by:

$$\frac{dV}{dr} = 0 \quad -(1)$$

where:

$$V = \frac{1}{2}mc^2 - mc^2\frac{r_s}{r} + \frac{mL^2}{2r^2} - mL^2\frac{r_s}{r^3}. \quad -(2)$$

Therefore from eqs (1) and (2):

$$r = \frac{1}{2c^2r_s}\left(L^2 \pm L\left(L^2 - 12c^2r_s^2\right)^{1/2}\right) \quad -(3)$$

In the Newtonian limit:

$$r_s \rightarrow 0 \quad -(4)$$

and

$$r \rightarrow \frac{L^2}{c^2 r_s} \quad -(5)$$

where

$$|r_s| = T / R \quad -(6)$$

So:

$$\boxed{r \rightarrow \frac{L^2}{c^2} \cdot \frac{R}{T}} \quad -(7)$$

In this limit:

$$L \rightarrow rv \quad -(8)$$

where v is the orbital velocity, so:

$$\boxed{\frac{R}{T} \rightarrow \left(\frac{c}{v}\right)^2 \cdot \frac{1}{r}} \quad -(9)$$

2)

In the solar system:

$$\frac{R}{T} = \frac{c^2}{2GM} \quad -(10)$$

to an excellent approximation, so:

$$\frac{c^2}{2GM} = \frac{c^2}{v^2 r} \quad -(11)$$

and $$rv^2 = 2GM \quad -(12)$$

The Earth's orbital velocity v is found from eq. (12) given the mass of the sun M, G and r (93 million miles).

Therefore for the Earth, the torsion T is very small compared with the curvature R. Its orbit is stable at 93 million miles in Newtonian physics, but the Pioneer anomaly shows that the orbit is actually decreasing very slightly per year. So from eq. (7), R/T is decreasing very slightly.

For a binary pulsar the orbit is very elliptical, and so eq. (2) cannot be used. The complete field equation must be solved. In a relativistic circular orbit, eq. (3) must be used.