378(4): Development of the Theory of Precession with the Hamiltonian

i) Classical Hamiltonian

$$H = \frac{1}{2} m \left(\dot{x}^2 + \dot{y}^2 \right) - \frac{mMG}{(x^2+y^2)^{1/2}} \quad -(1)$$

and the field equations give:

$$\frac{\ddot{x}}{\ddot{y}} = \frac{\kappa_x}{\kappa_y} . \quad -(2)$$

The force equations are:

$$\ddot{x} = - \frac{mGx}{(x^2+y^2)^{3/2}} \quad -(3)$$

$$\ddot{y} = - \frac{mGy}{(x^2+y^2)^{3/2}} \quad -(4)$$

So

$$\frac{\ddot{x}}{\ddot{y}} = \frac{x}{y} = \frac{\kappa_x}{\kappa_y} \quad -(5)$$

and

$$x \kappa_y = y \kappa_x . \quad -(6)$$

Differentiating both sides of Eq. (6) gives:

$$\dot{x} \kappa_y + x \dot{\kappa}_y = \dot{y} \kappa_x + y \dot{\kappa}_x \quad -(7)$$

The initial conditions for solving eqs. (3) and (4) are therefore:

$$\frac{\ddot{x}(0)}{\ddot{y}(0)} = \frac{x(0)}{y(0)} = \frac{\kappa_x(0)}{\kappa_y(0)} \quad -(8)$$

and:

2) $$\dot{X}(0)\kappa_Y(0) + X(0)\dot{\kappa}_Y(0) = \dot{Y}(0)\kappa_X(0) + Y(0)\dot{\kappa}_X(0) \quad -(9)$$

So eqns. (3) and (4) are solved with these initial conditions

By inputting $\kappa_X(0)$, $\kappa_Y(0)$ as constants, we have:

$$\dot{\kappa}_X(0) = \dot{\kappa}_Y(0) \quad -(10)$$

and the initial conditions simplify. In general, κ_X, κ_Y, $\dot{\kappa}_X$ and $\dot{\kappa}_Y$ are not constants. The orbit is completely determined by integrating eqns. (3) and (4) numerically, so $X, Y, \dot{X}, \dot{Y}, \ddot{X}$ and $\ddot{Y}$ are known. Therefore:

$$X\kappa_Y = Y\kappa_X \quad -(11)$$

$$\ddot{X}\kappa_Y = \ddot{Y}\kappa_Y \quad -(12)$$

$$\dot{X}\kappa_Y + X\dot{\kappa}_Y = \dot{Y}\kappa_X + Y\dot{\kappa}_X \quad -(13)$$

It is also known that:

$$\kappa_X = -\frac{X}{X^2+Y^2} \quad -(14)$$

$$\kappa_Y = -\frac{Y}{X^2+Y^2} \quad -(15)$$

and

$$X = -\frac{\kappa_X}{\kappa_X^2+\kappa_Y^2} \quad -(16)$$

$$Y = -\frac{\kappa_Y}{\kappa_X^2+\kappa_Y^2} \quad -(17)$$

The initial orbital velocity is:

$$v^2(0) = \dot{X}(0)^2 + \dot{Y}(0)^2 \quad -(18)$$

3) and the initial position is:

$$r^2(0) = x^2(0) + y^2(0) \quad -(19)$$

and

$$H = \frac{1}{2} m v^2(0) - \frac{mMG}{r(0)} \quad -(20)$$

$$= \text{constant}$$

and this remains a constant of motion. From eqs. (16) and (17):

$$x^2 + y^2 = \frac{\kappa_x^2 + \kappa_y^2}{(\kappa_x^2 + \kappa_y^2)^2} = \frac{1}{\kappa_x^2 + \kappa_y^2} \quad -(21)$$

So:

$$r^2(0) = x^2(0) + y^2(0) = \frac{1}{\kappa_x^2(0) + \kappa_y^2(0)} \quad -(22)$$

Therefore:

$$H = \frac{1}{2} m v^2(0) - mMG\left(\kappa_x^2(0) + \kappa_y^2(0)\right)^{1/2} \quad -(23)$$

and

$$v^2(0) = \frac{2}{m}\left(H + mMG\left(\kappa_x^2(0) + \kappa_y^2(0)\right)^{1/2}\right) \quad -(24)$$

$$= \dot{x}^2(0) + \dot{y}^2(0)$$

It is clear from Eq. (22) that using $\kappa_x(0)$ and $\kappa_y(0)$ as input parameters will result in a different initial $r(0)$ and $v(0)$. This is an example of aether engineering.

) The initial velocity and position for the Newtonian
llipse are defined by:

$$v^2(0) = MG\left(\frac{2}{r(0)} - \frac{1}{a}\right) \quad -(25)$$

here a is the semi major axis:

$$a = \frac{\alpha}{1-\epsilon^2} \quad -(26)$$

Therefore the hamiltonian is, initially:

$$H = \frac{1}{2} m v^2(0) - \frac{mMG}{r(0)} = -\frac{mMG}{a} \quad -(27)$$

From eqs. (24) and (27):

$$v^2(0) = \frac{2}{m}\left(-\frac{mMG}{a} + mMG\left(\kappa_x^2(0)+\kappa_y^2(0)\right)^{1/2}\right)$$

$$= 2MG\left(\left(\kappa_x^2(0)+\kappa_y^2(0)\right)^{1/2} - \frac{1}{a}\right) \quad -(28)$$

$$= \dot{x}^2(0) + \dot{y}^2(0)$$

Retrograde Precession

In this case the force equations are:

$$\ddot{x} = -\frac{MG}{r^3}\frac{x}{(x^2+y^2)^{1/2}} \quad -(29)$$

$$\ddot{y} = -\frac{MG}{r^3}\frac{y}{(x^2+y^2)^{1/2}} \quad -(30)$$

where:

$$\gamma = \left(1 - \frac{v_0^2}{c^2}\right)^{-1/2} \quad -(31)$$

Here v_0 is the Newtonian velocity defined by:

$$v_0^2 = MG\left(\frac{2}{r} - \frac{1}{a}\right) \quad -(32)$$

The hamiltonian for retrograde precession is defined by:

$$H = \gamma mc^2 - \frac{mMG}{(X^2+Y^2)^{1/2}} \quad -(33)$$

so

$$\gamma = \frac{H}{mc^2} + \frac{MG}{c^2(X^2+Y^2)^{1/2}} \quad -(34)$$

From eqs. (3), (4), (29) and (30) it is seen that the retrograde precession becomes more and more pronounced as:

$$\gamma \rightarrow \infty \quad -(35)$$

i.e. as

$$\frac{1}{\gamma^3} \rightarrow 0 \quad -(36)$$

This means

$$\left(1 - \frac{v_0^2}{c^2}\right)^{3/2} \rightarrow 0 \quad -(37)$$

i.e.

$$v_0 \rightarrow c \quad -(38)$$

If the orbit is regarded as approximately

6) Newtonian in the first approximation then the initial velocity is maximized from eq. (28):

$$\kappa_x^2(0) + \kappa_y^2(0) \rightarrow \infty \quad -(31)$$

So a very large precession can be engineered by eq. (31).

In fact there is an upper bound on v_0^2 in ECE2 theory:

$$v_0^2 \rightarrow \frac{c^2}{2} \quad -(32)$$

which is the condition for light deflection due to gravity (see earlier UFT papers). So:

$$2mG\left(\left(\kappa_x^2(0)+\kappa_y^2(0)\right)^{1/2} - \frac{1}{a}\right) \rightarrow \frac{c^2}{2} \quad -(33)$$

Forward Precession

The force equations are:

$$\ddot{X} = \frac{mG}{\gamma\left(X^2+Y^2\right)^{3/2}}\left(\frac{\dot{X}\dot{Y}Y + X\dot{X}^2}{c^2} - X\right) \quad -(34)$$

$$\ddot{Y} = \frac{mG}{\gamma\left(X^2+Y^2\right)^{3/2}}\left(\frac{\dot{Y}\dot{X}X + Y\dot{Y}^2}{c^2} - Y\right) \quad -(35)$$

and the difference between these equations and eqs. (3) and (4) is again maximized when

$$\gamma \rightarrow 0 \quad -(36)$$

and under condition (33).