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Gravitational precession formula as extension of Newton ULG

The introduction of the formula calculating precession as result of presence of three gravitational bodies permits the calculation of all the possible precessions in the solar system (where the Sun gravitational mass is, by far, larger than the one of the planets).

This formula based on Newtonian dynamics since contains a modification of Newton's ULG, as far as *I tempted it* gives simple convincing, and elegant, *results*, to the point that I feel confident to claim that it introduces a new chapter in the study of the gravitational phenomena, since:

a) is obviously Newton but gravitational acceleration caused by the third body (the satellite causing precession M_{SCP}), over the mass of the satellite subjected to precession (M_{SIP}) and the cause of ESF depression on the M_{SIP} also gravitational have to be interpreted intuitively on the base of the contribution to knowledge given by the UDS (a theory that I developed on the assumption of the existence of the Ether/ESF)

b) from a beginning that gives an increase of the value of orbital velocity obtained through Newton's ULG as mentioned in a) we need a further adjustment, obtained using an "equalizer" coefficient, based on the fact that the mass of the satellite subjected to precession (M_{SIP}) and the mass of the satellite causing precession (M_{SCP}) have, by necessity, different orbital velocities causing cyclical oscillations of acceleration and depression tied up to correspondent variations of precession.

c) Newton's formula is reversible only in theory (since the establishment of an orbital path is unilateral, (given that a satellite of small size orbits the Sun but not vice versa), this formula of precession instead when applied at hoc can exchange the values of some of its terms when the functions of the satellites are inverted (since their sizes have similar orders of magnitude).

d) results (effects) can be superposed therefore we use a formula regarding the precession inflicted, over the M_{SIP} chosen, by one satellite at the time and after calculation we sum the results obtaining a total value.

The simple sequence of formulations giving the gravitational precession is shown below (in essence it consists of an adaptation of Newton's Law permitting to solve a simple three bodies problem, considering two small objects in orbits

not very close, around a central Large gravitational one) since in the simple orbital conditions prevailing in the Solar system the addition of a constant velocity to the orbital velocity (also constant) only causes precession in the orbit, whereas with masses of comparable sizes the orbital paths (if close enough) would become chaotic.

We can say that the range of existence of the formulations below fits into the physical conditions of existence of our solar system:

r_1 radius of the satellite in precession (M_{SIP}) ; (r_M , Mercury in this case)
 r_2 radius of the satellite causing precession (M_{SCP}) ; (r_V , Venus in this case)

$$\frac{1}{\bar{r}^2} = \frac{1}{(r_2 - r_1)^2} + \frac{1}{(r_2 + r_1)^2}$$

F_{SCP} Force causing precession (acting over M_{SIP})

$$F_{SCP} = M_{SIP} \frac{kM_{SCP}}{4\pi\bar{r}^2} = M_{SIP} a(\bar{r})_{SIP}$$

$a(\bar{r})_{SIP}$ acceleration caused by F_{SCP} over the mass M_{SIP}

$$v(r_1)_{0SIP}^2 = \frac{kM_{SUN}}{4\pi r_1} = a(r)_{SUN} \cdot r_1 \text{ depression of ESF caused on } M_{SIP} \text{ by}$$

the Sun (central M_{LGM}), expressed in physical units equivalent to mass-energy.

$v(r_1)_{0SIP}$ orbital velocity of Mercury around the Sun at r_1 constant [m/sec].

$$(k/4\pi) = G = 6.673 \text{ e } -8$$

$\Delta\bar{v}_{SIP}^2 = a(\bar{r})_{SIP} \cdot r_1$ Extra depression of ESF causing precession, to be added to the orbital depression, expressed in physical units equivalent to mass-energy.

intermediate value of precession:

$$\bar{v}_P = \sqrt{\Delta\bar{v}_{SIP}^2 + v(r_1)_{0SIP}^2} - v(r_1)_{0SIP}$$

Final true value of precession case by case :

$$V_P = \bar{V}_P \cdot \frac{\text{No. of orbits run over 100years by external planet}}{\text{No. of orbits run over 100years by internal planet}}$$

Or :

$$V_P = \bar{V}_P \cdot \frac{\text{Period of revolution of internal planet}}{\text{Period of revolution of external planet}}$$

Note: the ratio between orbits is to be considered as an “equalizer coefficient”, let us now proceed with the calculations.

Gravitational precession of the planet Mercury caused by the planet Venus.

Example of calculation:

$$r_1 = r_M = 5.79 \text{ e } 10 \text{ km}$$

$$r_2 = r_V = 1.08 \text{ e } 11 \text{ km}$$

$$\frac{1}{\bar{r}^2} = 4.347 \text{ e } -22 \quad \bar{r} = 4.79 \text{ e } 10 \text{ m}$$

$$M_{SIP} = M_M = 0.3332 \text{ e } 21 \text{ Ton}$$

$$M_{SCP} = M_V = 4.87 \text{ e } 21 \text{ Ton}$$

Force inducing Precession, exchanged between Venus and Mercury:

$$F_{SCP} = 0.3332 \text{ e } 21 \cdot 6.673 \text{ e } -8 \cdot 4.87 \text{ e } 21 \cdot (4.79 \text{ e } 10)^{-2} = 4.707 \text{ e } 13 \text{ kN}$$

Acceleration causing Precession:

$$a(\bar{r})_{SIP} = \frac{F_{SCP}}{M_M} = 1.4126 \text{ e } -7 \text{ m/sec}^2$$

Extra depression of ESF over M_M :

$$\Delta \bar{V}_{SIP}^2 = 1.4126 \text{ e } -7 \cdot 5.79 \text{ e } 10 = 8179.3 \frac{\text{m}^2}{\text{sec}^2}$$

Orbital velocity of Mercury:

$$v(r_1)_{0SIP} = v_{0M} = 47887 \text{ m/sec}$$

Intermediate value of velocity of precession:

$$\bar{v}_P = \sqrt{8179.3 + 47887^2} - 47887 = 8.54 \text{ e-2 m/sec}$$

Final true value of precession in m/sec:

$$v_P = 8.54 \text{ e-2} \cdot \frac{162.6}{414} = 3.344 \text{ e-2 m/sec}$$

$$\text{Or: } v_P = 8.54 \text{ e-2} \cdot \frac{88}{224.7} = 3.344 \text{ e-2 m/sec}$$

Precession of Mercury in arcsec over 100 years caused by the planet Venus:

$$\alpha'' = \frac{v_p \cdot 36526 \cdot 86400}{2\pi r_M} 360 * 60 * 60 = 376.43 \frac{\text{arcs}}{\text{centy}}$$

The above calculation can be easily programmed and the results for the gravitational precession induced by the other planets over Mercury are shown below.

Mercury's precession components over 100 years as seen from Earth
(excluding the precession due to Earth rotation around the axis)

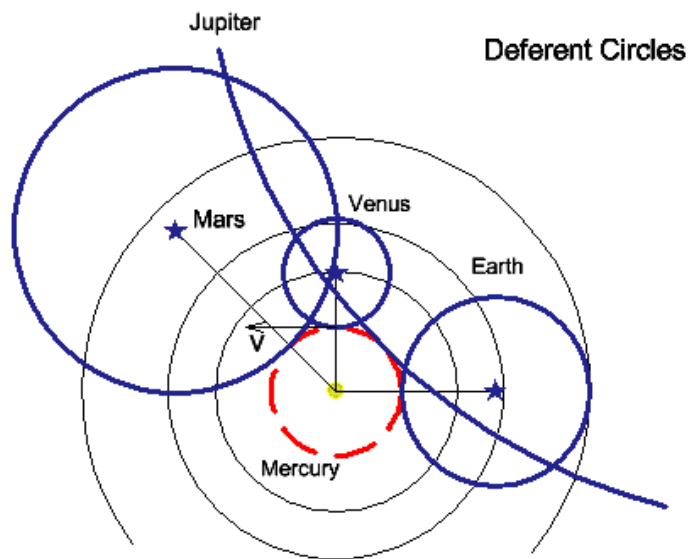
	UDS formulations	Le Verrier Calculations using the orbital eccentricity of Mercury ($\epsilon=0.2056$)
Planet	Arcs/centy	Arcs/centy
Mercury	N/A	N/A
Venus	376.43	280.6
Earth	92.15	83.6
Mars	1.76	2.6
Jupiter	58.82	152.6
Saturn	2.08	7.2
Uranus	0.03	0.1
Total	531.26	526.7
Total Precession measured	574.50	
Relativistic difference measured	43.24	
Relativistic Difference calculated	43.1	47.8

Note: total precessions values, as seen from Earth, were given in [ruggeri34](#) for all the planets up to Uranus, (as explained Earth was also included though an observer in it cannot detect Earth's precession, he could observe that value from another planet).

Comments regarding the application of methods of calculations used
by the ancient Scientists to modern problems

It would appear that I went back to the **Deferent** Circle the **Epicycloid** movement and the **Equant** coefficient, but I didn't go back to the past, since the concept, when the ancient Scientists developed it, was a living expression of human knowledge it still shows its vitality and truth in the formulations of precessions presented here.

In the formulations developed in order to calculate the precession nothing is contrived (the reader can use slightly different base values obtaining deviations from the results on the table but the totals he will obtain will not be much different from the total in the table) and the concepts are old and tested though I would say that they are applied in original manner (especially in regard to the extension of Newton formula to the third body).



$$V_{precess} = \left(\sqrt{\Delta V_{OSIP}^2 + V_{OMerc}^2} - V_{OMerc} \right) \cdot \frac{\text{period of internal planet}}{\text{period of external planet}}$$

Note: the adoption of the concept of depression to get orbital velocity is a concept developed from the ULG and extended by the UDS

Note: the ratio $\frac{\text{period of internal planet}}{\text{period of external planet}}$ is an equalizer that takes into account the relative orbitals

Note: the depression term ΔV_{OSIP}^2 is caused by the gravitational effect over Mercury orbital velocity by the Mass acting over Mercury it can be maintained constant only if the alignment is constant and since it does not happens the value of precession obtained needs to be multiplied by an equalizer



As can be noticed the formulations above never mention eccentricities and yet give the exact value of total precession induced over Mercury by the most relevant planets (and the same formulations can be extended universally to the other planets), further, the simplicity of the formulations (easy to develop into a small algorithm, available on request) makes almost impossible to botch up results, which then must be evaluated and possibly approved as genuine.

In the paper [Ruggeri34](#) I questioned the manner in which the precession was obtained for Mercury since it used the eccentricity of the orbital path, (being eccentricity a feature very little present in the other planets of the Sun, it will result almost impossible to generalize the formulations using eccentricities) whereas the formulations developed by me as part of the UDS do not consider (up to a point including Mercury with its large value of eccentricity) the eccentricities of the orbits which are assumed of constant radius, and assuming that if there is any error due to eccentricity, it is small and is to be overlooked.

For the results that starting from Le Verrier and conventionally accepted at present, take into account the eccentricities of the orbits, my comment is that before developing the formulations giving the precession of Mercury, “Le Verrier was successful in determining the coordinates giving the position of Neptune and this he must have done only assuming gravitational effects over circular orbits, (given the proximity of the orbits of the concerned planets to alignment and the short times of observation, the relevant calculations should have been possible without using the “*equalizer*” coefficient used above), but when dealing with Mercury he discarded the purely gravitational formulations (used up to that point) in favor of a solution using the eccentricity.

Astonishingly his mathematical genius in part failed him since he found the right solution in the most controversial way, due to the fact that the eccentricity of the orbit of Mercury is due to a freak effect caused by resonance induced by the other planets of the Sun over the orbital movement of the very small planet Mercury.

Uncannily enough the calculations considering the orbital eccentricity give the *true Total value of precession* as a sum of values very different from those calculated assuming circular orbits (see the above table).

The calculations provided here, since they do not contain values of eccentricity can be extended universally to orbits approximately circular; whereas this cannot be done with the formulations using the eccentricity therefore we have to assume that the formulations excluding the eccentricities could be more reliable.

The formulations using the eccentricity lack universality and the *mystery* connected with the fact that Le Verrier obtained the true result (and he was convinced that his results were right, as in fact they were) *remains unsolved*, unless we assume that he had also developed the purely gravitational results (excluding the eccentricity) using the formulations above introduced by me (and this is a very possible suggestion) and being in possession of two coinciding values he convinced himself that he had the answer.

Nevertheless when he had to present his conclusions he choose to present the formulations associated to the eccentricity of Mercury orbit discarding the others (purely gravitational) in fear to be ridiculed by the scientific community since these results were based over the recently discarded concepts using the *Deferent-Epicycloid-Equant triad*.

Of course, what presented above, can be dismissed as pure speculation, but I invite the reader to look at the paper [Ruggeri33](#) where in [Appendix I](#) is presented a similar case of coincidence of times related to two different orbital formulations

regarding the geometric “relativistic” precession and the temporal precession that in that case are obtained making an *ad hoc* choice of orbital radius.

We, then, in [Ruggeri33](#) have an example of coincidence of values in the GPS for two different formulations associated to two different physical interpretations related to a phenomenon in phase of development, and I do not see why, in Science, there cannot be more than one special similar case (more than one singular point).

Note: the precession is a fertile topic far to be exhausted and related to a very special section of the more complex problem relating three or more gravitational bodies, whereas the orbital paths of the, gravitationally related two or more masses in orbit, are to be considered stable due to their extremely small size and good distance from the central Large Gravitational Mass M_{LGM} of the system.

This infers that the extension made here to Newton's ULG is limited to the special case, assuming reasonably circular orbits, assuming that the planets are far enough that there are not excessive perturbations when there is collimation, and assuming on the whole that the configuration of the system having a Large Gravitational Mass M_{LGM} in the Center, (as is the case of the solar system) is stable.

In these circumstances then, the formulations used have an opportunity to reveal themselves true provided the time range of the phenomenon occupies at least the time interval of the larger orbit of the two planets concerned (cfr. the “equalizer” term).