PART III

VORTICES AND QUANTIFICATION ATTEMPTS

1. The Vanity of Competing with Newton's Model

The main purpose of this essay is to outline an alternative philosophical approach to the description of the gravitational force, with a view to promoting a direct control over this force. Mathematics has here been used as a shorthand means towards conclusions inherent in the hypotheses formulated, as well as a language aimed at minimising the inborn ambiguities of any human attempt to communicate.

The vision of gravitation proposed by this essay is substantially qualitative, because no new quantitative entity has been defined so far: No example of vortex constant parameter has been calculated, due to the fundamental uncertainty concerning, for instance, the speed of the plenum relevant to either the solar or terrestrial vortex. In simple terms, the whole theoretical discussion doesn't enable anyone to make significant quantitative predictions as it would instead be proper to any scientific work.

The intent of this section of my essay is trying calculations to determine – in a very first approximation – some of the parameters introduced in Part II, according to the few certain data that are available out of the Newtonian system of parameters, because all of the known astronomic masses and gravity accelerations have been calculated by use of Newton's gravitation law. In proposing an alternative gravitational law I must avoid all that which is not pertinent to the new paradigm outlined.

It is a hard task. Newton's theory of gravitation is a charming model of universe because of both the smart way in which it was derived and its unrivalled simplicity joint to effectiveness. It remains a steady reference conceptual frame also for General Relativity to the extent to which General Relativity imposes the conditions under which it becomes consistent with Newtonian gravitation. Not to forget that a crucial role is played in General Relativity by Newton's universal gravitational constant. Yet, as of today, Newton's cosmology remains basically more useful than General Relativity does.

Then, why should we try alternatives? In my view, the only justification to go beyond Newton's cosmology is in the hope to attain a direct control on gravitational force. Newton did wisely renounce any explanation for why masses *seem* to attract each other. And his farsighted attitude has left room for doubts and further questions. He stated that masses behave *as if* attracted by each other, so opening to the question whether masses are the cause or the effect of their tendency to merge. Thus far, irrespective of any answer to this question, the theoretical problem could brilliantly be overcome following the behaviour of masses, which is in any case the visible and measurable effect of whatever cause. So, thanks to Newton, not only can we measure masses *on* the Earth, but also the mass *of* the Earth, along with that of Sun, Moon, planets, stars, galaxies, as well as of molecules and atoms. Nevertheless, it must be stressed that all the values that have been determined for astronomic masses by use of Newton's law are *conventional*, in that they depend basically on the agreed value of universal constant G and of Newton's gravitational law. We could consistently remain within the Newtonian conceptual framework even if the currently adopted value for G should be modified by a new international scientific convention. This is why, in approaching gravitational issues by use of a different conceptual framework, I cannot adopt any of the parameters that have been calculated on the basis of Newton's gravitation law. For example**:** the weight of 1 kg was conventionally associated with the mass of 1000 cubic centimetres (one litre) of water at 4 degrees Celsius, assumed as the measurement of the mass unit. Then, by use of Newton's law, it is possible to determine the mass of the Earth because the force of $1\ \mathbf{kg} = g \times 1 = GM \times 1/r^2$, where $g = 9.81\ \mathbf{m/sec^2}$ is the measurable gravity acceleration at the sea level on the Earth's surface, $r = 6.371\times10^6$ metres is the mean radius of our planet's spheroid, and $G = 6.6732\times10^{-11}$ is the value of the Newtonian universal gravitational constant in the inter-national measurement system. Solving for M, one obtains the mass of Earth, *i.e.*,

$$M = g\,r^2 / G = 5.97\times10^{24}\ \mathbf{kg},\ \text{approximately.}$$

Starting from this determination, thanks to Newton's law the mass of the Sun and that of each planet and satellite can easily be calculated, once orbital distances and speeds are known.

Therefore, along with solar and planetary masses also the relevant gravity accelerations can immediately be determined by use of Newton's law. In this way, the Newtonian cosmological system becomes fully self-consistent. As a matter of fact, this cosmological system – at least as far as the solar system is concerned – works well. "Minor" discrepancies between theory and observations are the subject of more or less reasonable interpretations but seem not sufficient to impel astronomers to dismiss the Newtonian model.[1]

---

[1] Refer also to the discussion made in Paragraphs 5.2.1 to 5.2.3, Part II, about Newton's gravitation law.

Competing with such a model without using its outcomes requires the adoption of credible starting points in the form of a justifiable quantification of independent basic parameters. It's a very difficult task; perhaps it's impossible, in absence of any appropriate experimental activity. Dealing with system of vortices is rather a complicate exercise, whereas Newton's model is by comparison an example of extraordinary simplicity, elegance and effectiveness. Unfortunately, even Newton's model has a limited range of effectiveness just because of its simplicity and elegance, when the subject of our investigation reveals a system that is much more complex than expected. It's not only the "minor" matter of perihelion precessions or orbital "irregularities" (see, for instance, the inclination of the Moon's orbit with respect to the ecliptic). Complexity is now overwhelmingly emerging from the whole behaviour and structure of the universe we can observe.

2. The Vortex of the Earth-Moon System

The vortex from which the Earth-Moon system was born has a "core" and a "nucleus" made of volumes of non-physical space (*i.e.*, of *void*). The *Appendix* to this essay describes in detail core and nucleus as features intrinsic to any gravitational vortex.

In the model that I suggest, the *original mass* of a gravitational vortex is just the summation of these volumes of "nothingness". The *total mass* of any gravitational vortex should however include the whole set of *voids* generated by and included in the vortex considered, which means the whole system of minor/sub-minor vortices and matter generated by the activity of the principal vortex.

A first problem is the determination of the size of the ring-vortex by which the gravitational field is born.

I assume that the diameter of the *gravitational vortex core* is the maximum diameter of the *void ring* (this "void ring-doughnut" is in turn the core of the ring-vortex; see graphs in the *Appendix* herewith), from which the plenum's motion starts determining the velocity field of the gravitational vortex.

In all the equations presented in preceding Part II to describe the gravitational field of a vortex, constant n represents the core's radius (*i.e.*, the maximum radius of the "void ring-doughnut"), and V_c represents the maximum speed achieved by the plenum at its "contact" with the inner voids of the vortex. By use of Formula **[58]** of Part II, it has been inferred that it's possible for the plenum to achieve, with respect to the void, an initial speed that is more than 2.5 times the speed of light. More precisely, it has been calculated

[III.1] $$V_c = c(2\pi)^{1/2} = 7.514696\times10^{8}\ \text{m/sec}\ .$$

This estimate shall however be considered as a mere *working-hypothesis*, in absence of appropriate data. Such "maximum source speed" comes from three assumptions: **(*i*)** that "*black-holes*" can capture light because their gravity fields are vortices, where – at a "given distance" from the vortex core – the plenum flows at the speed of light; **(*ii*)** that the "given distance" – from the surface of the void core of the vortex – is just the gravitational "*standing-wave length*", at which the speed of the vortex stream equates the speed of light; ***(iii)*** that the propagation speed of the gravitational wave across the plenum is constant and equal to *c*. [2]

Assumptions ***(ii)*** and ***(iii)***, which lead to state that V_c is independent of the size of the vortex void core, seem questionable. As seen, Equation **[III.1]** is based on the hypothesis that *the propagation speed* of the gravitational standing wave is constant and equal to the speed of light. Instead, if a *kinetic viscosity* may be attributed to the plenum, there is also to conclude that ***the propagation speed*** of the gravitational field decreases with the distance from the vortex core, starting from an *absolute maximum* ***propagation*** *speed U* (possible and unknown universal constant), whereas the ***source speed*** V_c of the vortex stream depends on the size of the vortex core. This point is discussed in the attached *Appendix*. (In this connection, it is also worth considering a few observational data concerning *superluminal* motions detected in "jets" of galaxy disks, as briefly reported in Paragraph ***(v)*** of the *Special Appendix* herewith).

As far as the Earth is concerned, we know that any material body, in close proximity to the sea level, is subjected to a gravity acceleration which is – on average – 9.81**m/sec²**. According to the suggested new paradigm, gravity acceleration depends on the plenum's velocity field, but there is no clear indication of how the plenum moves in the terrestrial vortex, which generated the Earth-Moon system.

For a velocity field like that described in relation to **Figure 8** of Part II, the gravity acceleration of the gravitational vortex is expressed by Equation **[44].** However, **Figure 8** - along with the relevant theoretical discussion - allows for a very particular velocity field, which cannot be considered as either the typical or most common distribution of velocity in a gravitational vortex. In that case, it was assumed that the *inclination* of

[2] Say $\lambda = r_\lambda - n = cT$ the vortex *standing-wave length,* where r_λ is the distance from the core's centre at which the plenum moves at the speed of light, n is the radius of the vortex core, T is the circulation period of the plenum at the core's surface, and c is the speed of light. Then $v_\lambda = c$ (the plenum's speed at distance λ from the core's surface) is expressed by $v_\lambda = 2\pi\, n^2/(r_\lambda - n)T = 2\pi\, n^2/\lambda\, T = 2\pi\, n^2/cT^2 = V_c^2/2\pi\, c = c$, whence also $V_c = c\,(2\pi)^{1/2}$. This conclusion makes maximum speed V_c at the core's surface independent of the size of the vortex core. See also Formula **[58]**, Part II. Not to forget**:** $v_\lambda = c$ is a *working-hypothesis* only.

the velocity vector with respect to the vortex-sphere's meridians is continuously changing during the rotation of the plenum around the axis of the vortex.

There is to expect that the velocity distribution in gravitational vortices is in many cases simpler. For instance, one may suppose that the velocity vector does prevailingly form a constant angle with the vortex meridians. The analysis that follows is based on this simpler assumption, which is suggested by the observation of the solar system.

2.1 – *The vortex to address*

The velocity distribution considered in addressing the terrestrial vortex, which is the mother-vortex of the Earth-Moon system, assumes that there is a regular motion of the plenum corresponding to the simplest motion proper to a ring-vortex. As seen in Part II, the velocity of the plenum in a ring vortex has at least two components, one that rotates around the circular axis of the ring, the other parallel to this axis. The resulting threads of flux keep a constant inclination with respect to the axis of the ring, around which the fluid motion spirals.

A ring-vortex being the core of any gravitational vortex, the velocity/gravitational field comes from the propagation of the core ring-vortex motion through the plenum. As previously remarked, the velocity field created by a ring vortex tends to become spherical, for it is immersed in the linear current, orthogonal to the vortex ring plane, inherent in the autonomous motion of the ring-vortex (which propels itself by *sucking* plenum from one of its poles and *ejecting* plenum out of the opposite pole). Moreover, any ring vortex may be thought of as immersed in the current of a major vortex, which includes and delimits the former.

Therefore, with reference to **Figure III.1** in the following page, the study-vortex has a velocity distribution $\vec{V}$ defined by the following two components, one ($\vec{V}_p$) tangent to any "parallel", the other ($\vec{V}_m$) tangent to any "meridian" of the vortex spheroid, i.e.:

[III.2] $$\vec{V}_p = \vec{V}\cos\gamma$$

[III.3] $$\vec{V}_m = \vec{V}\cos(\pi/2-\gamma) = \vec{V}\sin\gamma$$

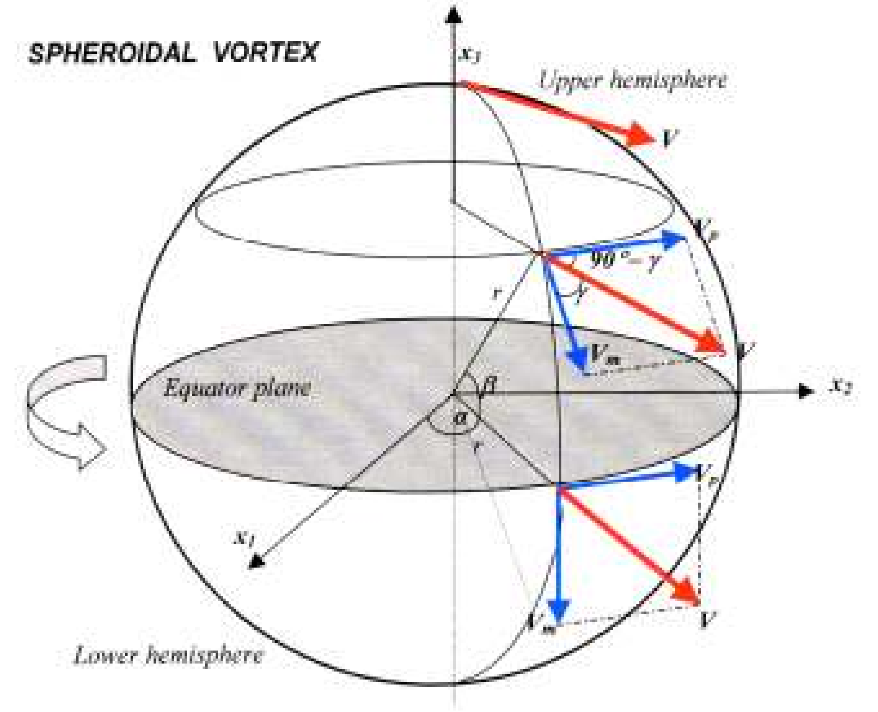
in which γ indicates the *constant* inclination of any thread of flux with respect to any meridian of the spheroid.

Module V of vector $\vec{V}$ remains constant with distance r from the vortex centre, according to equation

[III.4] $$V = nV_c / r$$

in which n is the radius of the vortex core and V_c is defined by **[III.1]** above. To simplify **Figure III.1**, the vortex core is represented by the centre of the sphere. The velocity field of any gravitational vortex is a field of stationary motion of the plenum.

Figure III.1



The polar co-ordinates of any point P of application of vector $\vec{V}$ are distance r and angular co-ordinates α and β . Angle β, in particular, indicates the "latitude" of the application point of $\vec{V}$. Then, the Cartesian co-ordinates of P are given by:

[III.5] $x_1 = r\cos\alpha\cos\beta$, $x_2 = r\sin\alpha\cos\beta$, $x_3 = r\sin\beta$,

while the modules of the Cartesian components of $\vec{V}_p$ and $\vec{V}_m$ – remembering **[III.2]** and **[III.3]** – are expressed by:

[III.6]
$$V_{p1} = -\, V_p \cos(\pi/2-\alpha) = -\, aV\sin\alpha$$
$$V_{p2} = V_p \sin(\pi/2-\alpha) = aV\cos\alpha$$
$$V_{p3} = 0\,,$$

in which $a = \cos\gamma = constant$, by hypothesis;

$$V_{m1} = V_m \cos(\pi/2-\beta)\cos\alpha = bV\cos\alpha\sin\beta$$

[III.7] $$V_{m2} = V_m \cos(\pi/2-\beta)\sin\alpha = bV\sin\alpha\sin\beta$$

$$V_{m3} = -V_m \sin(\pi/2-\beta) = -bV\cos\beta$$

where $b = \sin\gamma = constant$, by hypothesis.

Therefore, the modules of the components of $\vec{V}$ are:

$$V_1 = V_{p1} + V_{m1} = V(b\cos\alpha\sin\beta - a\sin\alpha)$$

[III.8] $$V_2 = V_{p2} + V_{m2} = V(a\cos\alpha - b\sin\alpha\sin\beta)$$

$$V_3 = V_{p3} + V_{m3} = -bV\cos\alpha\,.$$

The identification of the acceleration field associated with this velocity distribution requires the determination of the circulation of the velocity vector around any infinitesimal area at distance r from the vortex centre, as already shown by Equations **[41]** to **[44]** of preceding Part II . The calculation passes through the determination of $\nabla\times\vec{V}$, which is defined by

[III.9] $$\nabla\times\vec{V} = (\partial V_3/\partial x_2 - \partial V_2/\partial x_3)\,\vec{x}_1 + (\partial V_1/\partial x_3 - \partial V_3/\partial x_1)\,\vec{x}_2 + + (\partial V_2/\partial x_1 - \partial V_1/\partial x_2)\,\vec{x}_3$$

where $\vec{x}_1, \vec{x}_2, \vec{x}_3$, indicate the positive directions of Cartesian co-ordinates x_1, x_2, x_3, respectively, and

$$\rho_1 = \partial V_3/\partial x_2 - \partial V_2/\partial x_3$$

[III.10] $$\rho_2 = \partial V_1/\partial x_3 - \partial V_3/\partial x_1$$

$$\rho_3 = \partial V_2/\partial x_1 - \partial V_1/\partial x_2$$

are the modules of the Cartesian components of vector

[III.11] $$\vec{\rho} = \nabla\times\vec{V} = \pm\left(\sqrt{\rho_1^2 + \rho_2^2 + \rho_3^2}\right)\vec{r}\,,$$

in which $\vec{r}$ is the positive direction of vortex radius r.

By application of **[III.10]** to **[III.8]**, one obtains

$$\vec{\rho}_1 = -(b/r)V(1/\sin\alpha + \sin\alpha)\vec{x}_1$$

[III.12] $$\vec{\rho}_2 = -(b/r)V(1/\cos\alpha + \cos\alpha)\vec{x}_2$$

$$\vec{\rho}_3 = -(V/r)\{2a/\cos\alpha + b[\tan\alpha\tan\beta + +(1-\tan^2\alpha - \tan^2\beta)/\tan\alpha\tan\beta]\}\vec{x}_3$$

Let's now remember the theorem according to which the rotor of any vector does not depend on the choice of the reference frame. Moreover, with reference to **Figure III.1** and under the imposed condition γ = *constant,* module ρ of rotor $\vec{\rho} = \nabla\times\vec{V}$ must also be constant for any given r, to mean that - in the case of the velocity distribution described above - module ρ depends only on r. Therefore, it is always possible to choose a reference frame so as to have $\alpha = \beta = \pi/4$ for any considered point of the vortex, in order to write:

[III.13] $$j = (1/\sin\alpha + \sin\alpha) = (1/\cos\alpha + \cos\alpha) = 2.12132...$$ and

[III.14] $$\tan\alpha = \tan\beta = 1,$$

whence, by substitution in **[III.10],** one obtains

[III.15]
$$\rho_1 = -j(b/r)V$$
$$\rho_2 = -j(b/r)V$$
$$\rho_3 = -2\sqrt{2}\,(a/r)V.$$

2.2 – *The terrestrial vortex and the Earth-Moon system*

Once adopted the velocity distribution analysed in the preceding paragraph for the Earth's vortex, the other issue to address regards the possible value of angle γ, which gives – as seen – the constant inclination of the threads of flux with respect to the ring axis of the core ring vortex (or, more simply, with respect to either the "parallels" or the "meridians" of the vortex sphere).

The only way to try a response to the question is by inductive arguments, through an explanation why the axis of the terrestrial globe keeps its inclination constant with respect to the ecliptic's plane.

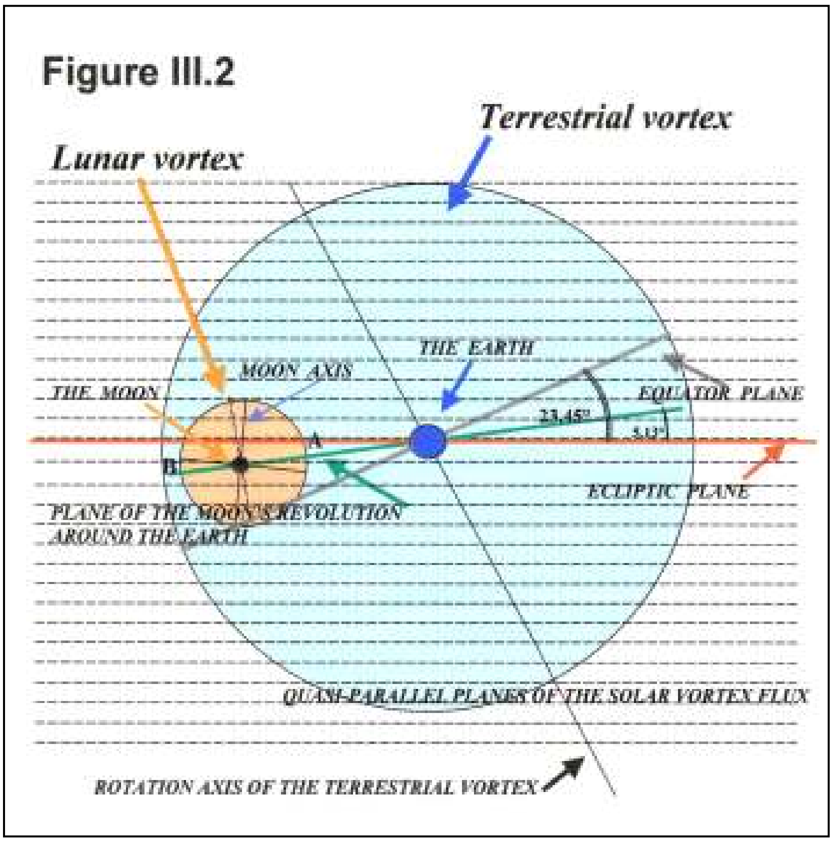


Figure III.2

The rotation of the Earth's globe must certainly reflect the rotation of its original vortex, which is included in the solar vortex and whose boundaries (which form a sort of spheroid shell) are supposed to be located somewhere far beyond the lunar globe (see **Figure III.2**).

The Earth's vortex must be delimited by those threads of flux of the solar vortex whose velocities are compatible with the threads of flux of the Earth's vortex. This most probably means that the streamlines of the solar vortex along the "shell" of the Earth-Moon system (or terrestrial vortex) match the fluid motion of the latter.

Allowing for the distance between the centre of the solar vortex and the centre of the terrestrial vortex, one may consider the streamlines of the solar vortex around the shell of the terrestrial vortex as flowing on quasi-parallel planes that intersect the terrestrial vortex by a 66.55 degree angle with respect to the central rotation axis of the latter, which is the inclination of the Earth's axis to the ecliptic.

As a conclusion, this fact should mean that the threads of flux of the Earth's vortex run basically over planes parallel to the ecliptic, i.e., with a 23.45 degree inclination with respect to the Earth's equator plane, and $\gamma = 90 - 23.45 = 66.55$ degree inclination to the direction of the Earth rotation axis, which is also the direction of the axis of the terrestrial vortex.

To the extent to which such a conclusion is acceptable, the determination of the main parameters of the terrestrial vortex is possible. Once established $\gamma = 66.55°$ (refer to **Figure III.1**), parameters a and b in all of the equations from **[III.6.1]** to **[III.15]** take the following values:

[III.17]
$$a = \cos\gamma = \cos(66.55°) = 0.3979486;$$
$$b = \sin\gamma = \sin(66.55°) = 0.9174077.$$

After substitution of the values for a and b in **[III.15]** above, module ρ of rotor $\vec{\rho} = \nabla \times \vec{V}$ is:

[III.18]
$$\rho = \frac{V}{r}\sqrt{4(jb)^2 + 8a^2} = \frac{V}{r}\sqrt{16.4163689} = 4.0517118\frac{V}{r} \quad .$$

Thus, using this value for the module of $\vec{\rho} = \nabla \times \vec{V}$ in Equation **[40]**, Part II, the gravity acceleration h_E obtained for the terrestrial vortex – following Equation **[44]** – becomes

[III.19]
$$h_E = 6 \times 4.0517118\frac{H_E^2}{r_E^3} = 24.310271\,\frac{n_E^2 V_c^2}{r_E^3} \ ,$$

in which n_E represents the radius of the core of the Earth's vortex, and $r_E = 6.371 \mathrm{x} 10^6$ **m** is the mean radius of the Earth.

Remembering now the assumption that the plenum's maximum speed $V_c = 7.514696 \mathrm{x} 10^8$ **m/sec** is the same for all vortexes, and if the centre of the vortex core coincides with the Earth's centre, at the Earth's surface the mean gravity acceleration h_E must equal $g = 9.81$**m/sec²** ; so as to write

[III.20] $$h_E = 24.310271 \frac{n_E^2 V_c^2}{r_E^3} = 9.81 \ \mathbf{m/sec^2},$$

whence one obtains

[III.21] $$n_E = \frac{\sqrt{\dfrac{9.81 \times (6.371 \times 10^6)^3}{24.310271}}}{7.514696 \times 10^8} = 13.594 \ \mathbf{m} \ .$$

That's the *radius of the terrestrial vortex core*; less than 28 metres its estimated diameter.

By use of this value for n_E it is also possible to make an assessment of the mean speed of the plenum at the Earth sea level. By definition, this speed is expressed by

[III.22] $$V_E = n_E V_c / r_E = 13.594 \times 7.514696 \times 10^8 / \ 6.371 \times 10^6 = 1{,}603.43 \ \mathbf{m/sec}.$$

It's the speed of the plenum's streamlines around the Earth on planes that form a 66.55° angle with the Earth's axis. In a comparison, it is worth noting that the rotation speed of the Earth at its equator is approximately 463**m/sec**, whereas the plenum's speed component V_E cos(23.45°) of V_E along the same equator is about 1,471.0 **m/sec**.

For future calculation, consider *the Earth constant*

[III.23] $$H_E = n_E V_c = 13.594 \times 7.514696 \times 10^8 = 1.0215478 \times 10^{10} \ \mathbf{m^2/sec}.$$

2.2.1 – *The lunar vortex*

The Moon is an agglomeration of matter caused by the action of a minor vortex in the Earth-Moon system. The lunar vortex is included-in and confined by the terrestrial vortex (refer to **Figure III.2**), and the centre of the Moon should house the core of such a minor vortex. The core's radius can be calculated starting from the gravity acceleration measured at the Moon's surface.[3]

[3] Remarkable and significant news is the Moon's frequent seismic activity detected by the instruments left there by Apollo lunar missions. It's a clear indication of a vortex core activity. As to the lunar gravity acceleration, it is

At the Moon's surface, the gravity acceleration is 1.6 **m/sec²**.

The calculations are heavily affected by the uncertainty concerning the plenum's velocity distribution in the vortices considered. I can only limit myself to conjecture that within the system of the solar vortex all of the minor vortexes (which are confined within the solar vortex) are characterised by analogous velocity distributions, and what varies from one vortex to another is only the inclination of the plane of flux with respect to the rotation axis of each vortex.

As to the threads of flux of the lunar vortex, one reasonable conjecture, in an analogy with the position of the terrestrial vortex inside the solar one, is that the planes of flux of the lunar vortex are parallel to the terrestrial ones, while the lunar orbital plane forms a 5.13 degree angle with the ecliptic. Moreover, it must be considered that the Moon's rotation axis is not perpendicular to the Moon's orbital plane, with which it forms instead an 83.5° angle. Then, there is to suppose that the lunar vortex axis, which should coincide with the Moon's rotation axis, has an inclination to the respective planes of flux equal to $\gamma_L = 83.5° - 5.13° = 78.37°$.

Thus, coefficients a and b of Equation **[III.18]** above become

[III.24]
$$a = \cos\gamma_L = \cos(78.37°) = 0.20159\ ;$$
$$b = \sin\gamma_L = \sin(78.37°) = 0.97947\ .$$

According to these coefficients, the module of the rotor of the plenum's velocity in the lunar vortex is determined by

[III.25]
$$\rho_L = \frac{V_L}{r_L}\sqrt{4(jb)^2 + 8a^2} = \frac{V_L}{r_L}\sqrt{17.593612} = 4.194439\frac{V_L}{r_L}\ .$$

in which $r_L = 1.7375 \times 10^6$ **m** is the radius of the Moon, V_L is the plenum's speed at the Moon's surface. These figures lead to the following equation, obtained after equalling the theoretical lunar gravity acceleration to its actual value (*i.e.*, $h_L = 1.6$ **m/sec²**), to determine

[III.26]
$$n_L = \frac{\sqrt{\dfrac{1.6 \times (1.7375 \times 10^6)^3}{25.166634}}}{7.514696 \times 10^8} = 0.7685\ \mathbf{m}\ ,$$

$n_L = 0.7685$ **m** being *the radius of the lunar vortex core*: It's about 17.7 times smaller than that of the terrestrial vortex core.

Then, at the Moon's surface, the calculated speed of the plenum is

---

assumed that the relevant datum has repeatedly been confirmed during Apollo missions.

[III.27] $V_L = n_L V_c / r_L = 0.7685 \times 7.514696 \times 10^8 / 1.7375 \times 10^6 = 332.37$ **m/sec**,

and the lunar vortex constant is

[III.28] $H_L = n_L V_c = 0.7685 \times 7.514696 \times 10^8 = 5.775044 \times 10^8$ **m²/sec**.

Any constant of the type represented by H_E and H_L provides a basic measurement of the relevant vortex size. The distribution in space of the speed of the plenum fluid is determined by constants of this kind, whereas the values of rotors $\vec{\rho}$ are associated with the direction of the plenum velocities and with the relative influence in determining the intensity of the gravity acceleration field of the vortex.

2.2.2 – *Boundaries of the lunar vortex*

The fact that the lunar vortex is confined within the terrestrial vortex entails the existence of a "shell-surface" that delimits the range of influence of the former. Inside such a shell the influence of the lunar gravity prevails over the terrestrial one, while the surface of the "shell" is a set of points in space where the two gravities neutralise each other. Therefore, there must also be one point, in the straight line that connects the centres of the two vortices, where the algebraic summation of the two opposite gravity accelerations is nil. Certainly this point belongs to the "shell" that confines the lunar vortex.

Referring to **Figure III.2** above, this point is indicated by "A".

Let's denote with δ_L the distance of A from the centre of the Moon, and with δ_E the distance of A from the Earth's centre. Then, it is possible to write the following two equations:

[III.29] $$h_L(A) - h_E(A) = 0$$

[III.30] $$\delta_L + \delta_E = D$$

in which $h_L(A)$ and $h_E(A)$ are the gravity accelerations in A relevant to the lunar and the terrestrial vortices, respectively, and D = 384,400,000**m** is the distance between the centres of the two vortices, i.e., the mean distance between Earth and Moon.

The lunar gravity acceleration in A is defined by

[III.31] $$h_L(A) = 6\frac{\rho_L H_L^2}{\delta_L^3} ,$$

while the terrestrial gravity acceleration in the same point is expressed by

[III.32] $$h_E(A) = 6\frac{\rho_E H_E^2}{\delta_E^3} ,$$

which makes Equation **[III.29]** become

[III.33] $$\frac{\rho_L H_L^2}{\delta_L^3} - \frac{\rho_E H_E^2}{\delta_E^3} = 0 \,,$$

whence, remembering the definitions previously given for H_L and H_E,

[III.34] $$\frac{\rho_L n_L^2}{\delta_L^3} - \frac{\rho_E n_E^2}{\delta_E^3} = 0 \;.$$

This, by use of Equation **[III.30]**, becomes

[III.35] $$(\mu_{EL} + 1)\,\delta_L^{\,3} - 3D\delta_L^{\,2} + 3D^2\delta_L - D^3 = 0$$

in which

[III.35a] $$\mu_{EL} = \frac{\rho_E n_E^2}{\rho_L n_L^2} = 302.2536 \;.$$

The analysis of third degree Equation **[III.35]** reveals that only one real solution exists, given by

[III.36] $$\delta_L = 49{,}850{,}537.2 \textbf{ metres} \,,$$ [4]

which – for the sake of simplicity – is here assumed as the mean radius of the lunar vortex spheroid.

The result shows that the influence of the Moon's gravity in the direction of the Earth doesn't go beyond 50,000 km, approximately, which is about 13% the mean distance D between Moon and Earth. Because of this result, one should exclude any lunar influence on the Earth, such as – for example – tidal effects. The rotational motion of the lunar vortex cannot propagate across the terrestrial vortex, since the stationary motions of the plenum in the two different vortices must keep compatible in every point of the space; which makes the plenum's gravitational field substantially different from the propagation of electromagnetic waves. The analogy with the behaviour of any fluid is still valid, considering, for example, the difference – as to the medium's behaviour – between the transmission of the rotational motion of the air in a tornado and the simultaneous propagation of the relevant howl.

This leads me to stress also another crucial difference between the Newton's model and the vortex model I'm here proposing. In Newton's model the gravitational effect of any mass, though attenuated by the

---

[4] The exact solution is $\delta_L = 49{,}850{,}537.20484760$ **m**.
By difference, $\delta_E = D - \delta_L = 334{,}549{,}462.8$ **m**.

competition with opposite effects from other masses, persists up to infinity. Instead, in my model most gravitational effects are substantially confined: The limited range of action is related to the size and power of the vortex from which the gravitational effects originate, against the size and power of the other vortex in which the former is normally included.

As pointed out in preceding Part II of this philosophical essay, another difference between the two models is in that for Newton (and for General Relativity as well) masses are supposed to be the cause of gravity, whereas in my model masses are instead supposed to be an effect of gravitational fields generated by vortices.

2.2.3 – ***Range of action of the terrestrial vortex. A tentative estimate***

The estimate of the mean radius of the terrestrial vortex depends strictly on the parameters proper to the solar vortex.

I am not sure that the datum concerning the gravity acceleration at the Sun's surface may be considered as quite reliable. It has been assessed by use of Newton's law. Moreover, my conjecture on the pattern of the plenum's threads of flux in the solar vortex is based only on the observation that the ecliptic makes a 7.25 degree angle with the Sun's equator.

As to the Sun, the available data are as follows:

- mean radius of the solar sphere: $R = 6.965\times10^{8}$ **m**
- mean gravity acceleration at the solar surface: $h_S = 273.42$ **m/sec²**
- mean distance between the Sun's and the Earth's centres: $K = 1.496\times10^{11}$ **m**.

The estimated parameters are:

- inclination of the thread of flux in the solar vortex: $\gamma = 90° – 7.25° = 82.75°$,

and, by use of Formulas **[III.18]** to **[III.23]**,

- coefficient of the rotor of the flux velocity in the solar vortex: $\rho_S = 4.223829803$
- radius of the core of the solar vortex: $n_S = 80{,}344.578$ **m** [5]
- solar constant: $H_S = 6.03765\times10^{13}$ **m²/sec.**

In an analogy with the precedent approximate determination of the mean radius of the lunar vortex, for the determination of the mean radius of the terrestrial vortex – as included in the solar one – I can now write the following two equations:

---

[5] The size of the core of the solar vortex results to be 5,910.3 times that of the terrestrial vortex.

[III.37] $$h_{E(X)} - h_{S(X)} = 0$$

[III.38] $$X_E + X_S = K$$

in which $h_{E(X)}$ and $h_{S(X)}$ are the Earth's and the Sun's gravity acceleration, respectively, at point X in the distance between the two vortex centres where the two accelerations neutralise each other. The above relations lead to the following third degree equation

[III.39] $$(\mu_{SE} + 1)X_E^3 - 3K X_E^2 + 3K^2 X_E - K^3 = 0$$

which is of the same type as Equation **[III.5].** In this equation,

[III.40] $$\mu_{SE} = \frac{\rho_S n_S^2}{\rho_E n_E^2} = 36{,}416{,}803.15,$$

X_E is the mean radius of the terrestrial vortex, K is the known mean distance between Earth and Sun, and $X_S = K - X_E$.

Also in this case, there is one sole real solution to Equation **[III.39]** as provided by

[III.41] $$X_E = 456{,}269{,}888 \text{ metres } [6],$$

which – on a first scale approximation – could be the mean value of the radius of the terrestrial vortex, provided that the data used for the calculation are reliable.

Thus, X_E is only about 3.05×10^{-3} the distance between Earth and Sun. It is markedly smaller than the mean radius of the visible solar sphere, which is in turn circa 1.53 times X_E . This implies that the volume of the visible solar sphere is approximately 3.58 times the volume of the "shell" of the terrestrial vortex, i.e., of the whole Earth-Moon system.

By addition of the *maximum* distance between Earth and Moon (at the Moon's apogee) with the mean radius of the lunar vortex (*i.e.*, $D_a + \delta_L =$ $= 406{,}364 + 49{,}850.537 = 456{,}214.537$ kilometres) one may conclude that the "shell" of the lunar vortex in actually contained in the spheroid of the terrestrial vortex, whose *mean* radius X_E exceeds by 55.35 kilometres the distance between the Earth's centre and the relative farthest limit of the lunar "shell". Therefore, it is licit to think that the lunar vortex orbits the Earth at the boundaries of the Earth's vortex.

[6] The exact solution is $X_E = 456{,}269{,}887.968001$ **m**.

3. A Conjecture about Tides

The values found above for δ_L and X_E are assumed to be approximate mean values for the radiuses of the shells of the lunar and terrestrial vortices, respectively. However, there is to observe that the state of immersion of any vortex in a major vortex makes the shell of the former rather irregular in its shape.

The shape of any minor vortex confined within a major one tends to be a strange ovoid, whose symmetries - if any - cannot be identified easily.

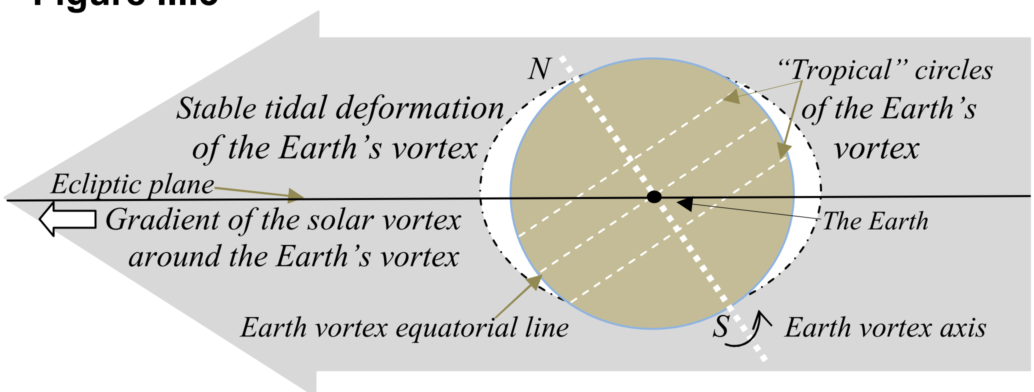
For instance, there is *not* to believe that the position of the point of the lunar vortex represented by "B" in **Figure III.2** is quite symmetrical to "A" with respect to the core of the same vortex. There is to consider that the velocity of the flux of the lunar vortex at *B* joins (*is* also) the velocity of the terrestrial vortex, whereas at point *A* the flux velocities of the two vortices are opposed to each other. In this connection, consider that the acceleration (Magnus effect) that keeps the lunar vortex away from the core of the terrestrial vortex is just the difference of the flux velocities between *B* and *A* with respect to the centre of the lunar vortex.

Quite analogous considerations are true also of the terrestrial vortex with respect to the solar one.

So far I found it difficult to elaborate upon the description of the geometrical shape of vortex shells.

My intention is now limited to observe that the shape of any "included vortex", simplified by an ellipsoid, entails a deviation from the spherical shape, which brings the whole space internal to the vortex to conform to the volumetric shape of the "shell". Any aggregate material, such as the matter of planets and satellites that gather around the cores of the respective vortices, does obviously adjust to the shape of the surrounding physical space (the plenum of their vortices).

Figure III.3



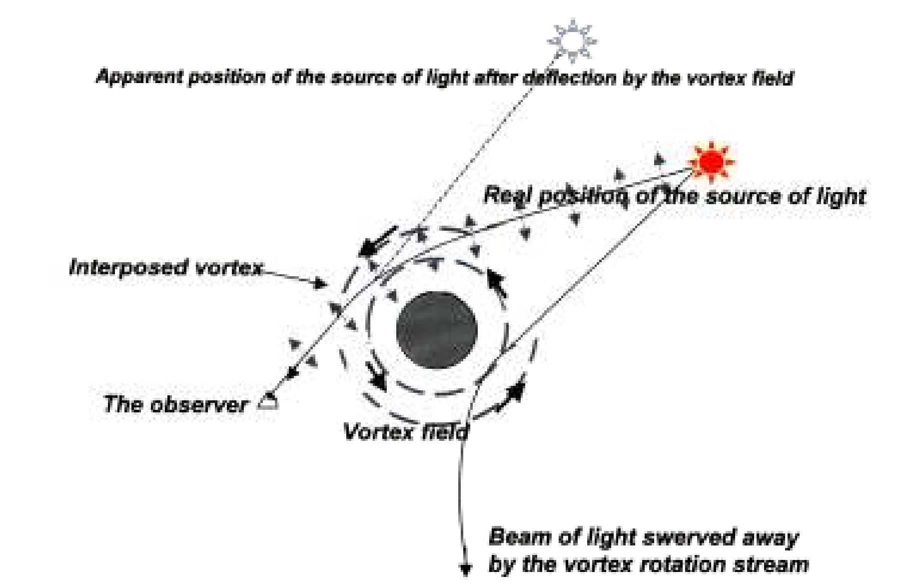
The Earth, in particular, shows what this means visibly through the adjustment of its most fluid materials, especially the waters of seas and lakes, subsequent to the periodic change of the relevant position with respect to the much more stable shape of the shell of the terrestrial vortex. It's the tidal effect affecting also the solid terrestrial soil, which can be explained in this way, thus providing the reason why simultaneous tidal effects occur almost symmetrically at the opposite sides of the Earth's surface during the rotation of the terrestrial globe, independently (honestly speaking) of the relative combined position of Sun and Moon.

Tidal effects are more markedly visible in the large strip of the Earth's surface adjacent to the plane of the ecliptic, *i.e.*, about the plane of the maximum intersection of the stream of the solar vortex with the terrestrial one. This maximum intersection runs almost symmetrically with respect to the centre of the Earth, approximately from the tangent to one tropical parallel to the tangent to the opposite tropical parallel.

4. Deflection of Light within Gravitational Vortices

The quick success of General Relativity was to a great extent promoted by the confirmation of the deflection of light caused by the solar mass, as predicted by Einstein and observed during the missions conducted by British astronomer Arthur Eddington in 1919, directed to the study of a solar eclipse. As already mentioned in Footnote 106 of Part II, Eddington's experiments had only 30% accuracy, and the observation of succeeding eclipses gave results that scattered between one half and twice the 1".74 of arc deflection predicted by Einstein.

Figure III.4



About 104 years before Einstein, German astronomer Johan von Soldner (largely ignored by most essays on Relativity) made an analogous prediction by use of Newton's gravitation law (see Part II, Footnote 89).

At present, astronomers and astrophysicists mention this gravitational effect to explain various kinds of observed phenomena, though some of them remark that the relativistic explanation appears inadequate. The effect consists of an observed change in the apparent position of one or more well identified stars when massive celestial bodies (such as large stars, neutron stars, "black holes", etc.) interpose between the source of light and the observer.

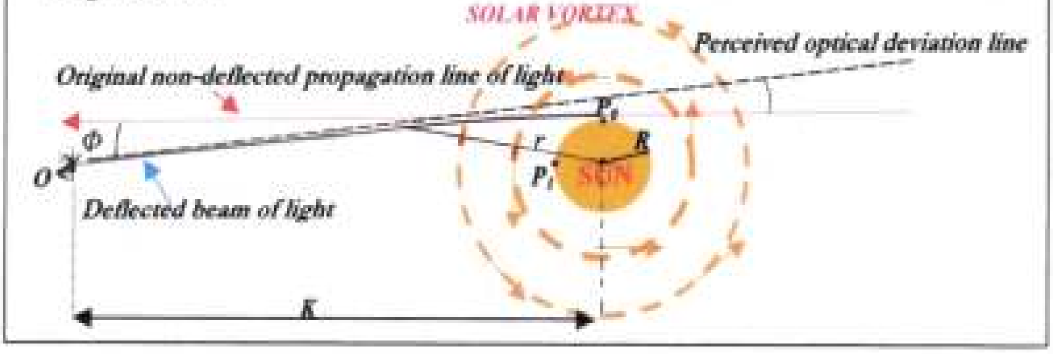
Perhaps, if we allow for vortex gravitational fields, the deflection of light can find a more credible interpretation.

Radiation transmission, similarly to sound transmission through fluids, adjusts to the local conditions of its transmission medium. Any gravitational vortex that interposes between the source of light and the observer modifies the route of the crossing light according to the flux of the plenum's streams that characterise the vortex. In the example sketch of **Figure III.4** the crossing light that is later detected by the observer is only the transverse wave of the light that follows the vortex flux directed toward the observer, while – at the opposite side of the vortex – the crossing wave is swerved away by the flux that recedes from the observer.

As an example of the new interpretation, and accounting for the currently available data relevant to the Sun, an approximate calculation of the deflection of light caused by the solar vortex is here tried, as it could be observed from the Earth.

Refer to the sketch of **Figure III.5**.

Figure III.5



Any photon, whose trajectory is initially tangential to point P_o in the surface of the solar sphere and moves on the ecliptic plane, undergoes a continued lateral shift along the thread of flux of the vortex. The flux speed in P_o is initially parallel to the beam of light, but the vortex speed direction changes continuously, while one of its components on the ecliptic plane is always directed toward the observer up to point P_1. After P_1 all the components of the vortex flux motion recede from the observer. The velocity of the photon, initially parallel to that of the vortex flux, adds continuously with the vortex flux velocity, whose direction is continuously changing while its parallel[7] component decreases. The velocity of light, which is much greater than that of the vortex flux, brings the photon from P_0 to the observer in approximately 500 seconds, the time that's necessary to light to travel the distance from the Sun to the Earth.

The incremental shift of the photon through the sequence of threads of flux encountered during its travel from P_0 to the observer is expressed by

[III.42] $$ds = d(Vt) = d\left(\frac{H_S\, t}{r}\right) = d\left(\frac{H_S\, t}{R+ct}\right),$$

in which $V = H_S / r$ is the speed of the vortex flux at distance r from the vortex centre,

$r = R+ct$ is the progressive distance of the photon from the vortex centre,

$R = 6.965 \times 10^8$ **m** is the radius of the solar sphere,

$c = 3 \times 10^8$ **m/sec** is the speed of light, t is the time in seconds elapsed in the photon's motion since its start from P_o, and

$H_S = 6.0376 \times 10^{13}$ **m²/sec** is the solar constant previously calculated.

Equation **[III.42]** must be integrated with respect to t between $t = 0$ and $t = 500$ **sec**, so as to write

[III.43] $$s = \int_{P_0}^{Observer} ds = \frac{H_S}{c}\int_0^{500} \frac{d(R+ct)}{(R+ct)} = \frac{H_S}{c}\left[\ln\frac{R+ct}{R}\right]_0^{500}$$

to obtain

$$s = 1{,}082{,}139.15 \text{ m}.$$

After dividing s by the distance $K = 1.5 \times 10^{11}$ **m** between P_o and the observer, one obtains the trigonometric tangent of the searched deflection angle φ; therefore,

[III.44] $$\varphi = \arctan(s/K) = 4.133467 \times 10^{-4} \text{ degrees} = 1''.488 \text{ of arc.}$$

This figure indicates the deflection of the beam of light as detected by an observer situated on the ecliptic's plane at 150million kilometres from the Sun, as if the beam of light were influenced by the solar vortex only. Instead, an observer situated at the same distance from the Sun but on the

---

[7] Parallel to the propagation of light.

Earth's surface must account for the counter effect due to the velocity field of the Earth's gravitational vortex.

Upon the assumption made here that the Earth's vortex has the same rotation direction as the Sun's vortex (see also **Figure 11**, Paragraph 5.7.2 of Part II), the route of the beam of light (P_0 to O in **Figure III.5**) undergoes a correction process as soon as it enters the sphere of action of the Earth's vortex, at about 4.4957×10^{8}**m** from the Earth's centre (as calculated by Formula **[III.41]** above). In the example case proposed, the correction to the deflection is very small. Following reasoning steps quite analogous to those expressed by Equations **[III.42], [III.43]** and **[III.44]**, the counter effect s_E caused by the Earth's vortex to the beam of light is

[III.45] $$s_E = \frac{H_E}{c}\int_0^{X_E}\frac{d(R_E+r_E)}{(R_E+r_E)} = \frac{H_E}{c}\ln\frac{X_E}{R_E}\ ,$$

where r_E is the variable distance from the centre of the Earth's vortex;
$R_E = 6.371\times10^{8}$ **m** is the Earth's mean radius
$X_E = 456{,}269{,}888$ **m** is the mean radius of the Earth's vortex (see **[III.41]**)
constant $H_E = 1.0215478\times10^{10}$ **m²/sec** (see **[III.23]**)
and $c = 3.0\times10^{8}$ **m/sec** is the speed of light.

Thus,

[III.46] $$s_E = 34.05159\ln 71.16167 = 145.4455 \text{ m.}$$

Therefore, the overall resulting shift S undergone by the beam of light is given by

[III.47] $$S = s - s_E = (1{,}082{,}139.15 - 145.4455)\text{ m} = 1{,}081{,}993.704\text{ m.}$$

The resulting deflection angle Φ is

[III.48] Φ = arctan(S/K) = $4.1329115\text{x}10^{-4}$**degrees** = 1".48785 of arc,

which is equivalent to 99.9898% of φ.

More important is remarking that the deflection of the beam of light has here been calculated as occurring along the ecliptic's plane, on which two components only of the involved velocities have been considered**;** whereas, in general, different degrees of deflection shall be expected when the source of the deflected beam does not lie on the ecliptic's plane, and the three components of all the involved velocities must be accounted for. This means, in particular, that a certain range of variability of Φ is associated with the variation of the angle of incidence of the beam of light with respect to the plane of the ecliptic. It should be evident that – for the observer – the beam deflection increases, *ceteris paribus,* with the visual distance of the beam's source from the ecliptic's horizon.

Moreover, the deflection angle is expected to change also according to the visual location of the beam's source with respect to the left/right–upper/lower sides of the Sun's disk seen by the observer, for the solar vortex stream makes asymmetrical resistance/strain to the transverse oscillation of the wave of light that propagates through the vortex gravitational field (a schematic indication of this is given by **Figure III.4**).

5. A Cause of Gravitational Red-shift.

The analysis expounded in the preceding paragraph leads to recognise that any beam of light that crosses a vortex field undergoes a *strain*, which prevents the route of the beam from being a straight line. For example, still referring to **Figure III.5**, the beam of light originated in P_0 must travel a route approximately as long as $P_0\,O$ to attain a distance equivalent to K. This means that there is a delay in the propagation of the light, caused by an inevitable *extension* of the route with respect to the straight-line propagation that occurs across a transmission medium in its "rest-state". Though keeping a constant propagation speed, the beam of light that crosses a vortex field is actually subjected to a *strain* of its wave length, to the extent to which the *transverse oscillation path* of the beam's wave has to compose with the motion paths of the vortex fluid medium.

For example, on a first approximation we may consider the ratio of route length P_0O to distance K as the average increment factor of the original wave length λ, in order to associate – along the route from P_0 to O – a modified *mean* wave length λ^* with the beam, to write

[III.49]
$$\lambda^* = \frac{\overline{P_0O}}{K}\lambda\,.$$

In the exercise carried out with reference to Figure III.5, we may assume

[III.50]
$$\overline{P_0\,O} \approx \sqrt{S^2 + K^2}\,,$$

to get

[III.51]
$$\lambda^* \approx \frac{\sqrt{S^2 + K^2}}{K}\lambda \approx (1 + 2.602 \times 10^{-11})\lambda > \lambda.$$

Correspondingly, there is also a process of wave frequency reduction. Said μ the wave frequency of the beam at its emission point, and the transmission speed c being constant, the observer situated in O detects a *red-shift,* equivalent to $-\Delta\mu/\mu$, associated with a loss $\Delta\mu$ of the wave frequency. Such a loss is

[III.52] $$\Delta\mu > \mu - c/\lambda^*,$$

considering that λ^* is only the *average value* of the strained wave length, whereas the final resulting strain undergone by the wave length is maximum at its detection point in *O.*

6. A Few Additional Conclusions

The main purpose of this Part III of my essay is to provide the outlined theory with a minimum numerical consistency, and to stress the need for appropriate experimentation. Indeed, the serious lack of objective data pertaining to my theoretical paradigm makes much of the preceding exercise questionable.

The experiment suggested in Paragraph 7.1 of Part II, if successful, could also be used to assess the actual orientation/inclination of the planes of flux in the Earth's vortex, as well as in the vortices of planets and satellites of the solar system.

The universe of gravitational vortices seems to me substantially destitute of universal constants, with the only *possible* exception of the speed of light and the other *possible* exception which regards the maximum rotational speed of the plenum around nuclei of void, as expressed by the relation $V_c = c(2\pi)^{1/2} = 7.514696\times10^8$ **m/sec**. However, as shown in the *Appendix* that follows, there are reasons for questioning this hypothesised constant value, on which I have nevertheless based the "quantification attempts" illustrated here.

As far as gravitation is concerned, masses as such do not play any active role, since the strength of a gravitational vortex is in every point in space expressed by the local acceleration field, which is determined by the circulation vector of the plenum's velocity.

At any given distance from the vortex core any mass undergoes an identical acceleration, which results in the effect of a gravitational force that one *might* also view as "generated" by the mass involved, *as if* the mass were the "cause" of the same force.

The acceleration field of any gravitational vortex depends basically on the size of the vortex core, on the distance from this and, secondarily, on the constant or variable orientation of the flux surfaces of plenum. In this connection, it's worth considering that the *quest for the huge amount of "missing mass" in the universe* appears hopeless, once ascertained that "mass formation" *is one of the effects* of the velocity fields generated by vortices or by other *fluid-kinetic states* of the plenum. Mass in itself *is not* the *cause* of any gravitational force.

Attraction or repulsion between vortices depends on the relative distributions of the plenum's velocities, which may add strength or subtract strength from the mutual attraction or repulsion acceleration, according to the "spins" of the relevant velocity fields.

At present, I have no other conclusion to draw from my work but remarking on the state of uncertainty of today's cosmology**;** while one cannot ignore that surprising events are day after day observed at larger cosmological scale, for which current cosmological models reveal inadequate. Amongst the showiest examples of phenomena in search for a persuasive explanation there are, beside the riddle of the *"missing mass"*, the *increasing acceleration of the galaxies' mutual recession* (as possibly confirmed against different interpretations of the red-shifts observed[8]), the impressive *flares* or *jets* emitted by galactic nuclei and the *superluminal speeds* observed in connection with the activity of those *jets.*

Finally, it is once more worth repeating that all theoretical constructions have neither scientific significance nor use if not corroborated by experimental evidence.

---

[8] Some theses of Halton Arp, supported by decades of rigorous observations, should be taken into much more consideration than that currently given by the academic establishment (Relatively recent works by Arp: ***Seeing Red****,* Apeiron 1998, and ***Discordant Redshifts Associations***, Apeiron, Montreal 2003).

In this connection, I would also dare the hypothesis that quasars are "quasi-galaxies" (or special *quasi-stars*) whose gravitational vortices have the respective main axis collimated with the observation line of sight. If such quasi-galaxies (or quasi-stars) travel *toward* the Earth, they "swallow" cosmic plenum at a very high speed (much higher than the quasars' opposite approaching speed) just along the main axes of their vortices, with the associated "creative" turbulence of the ingested swirling plenum. Particles of matter and radiation generated by the plenum's rapid influx onto the vortex nucleus (analogous to the air flux "swallowed" by the front side of an aircraft jet engine) do actually imply a remarkable red-shift effect with respect to the observer. To conclude, almost paradoxically, that the quasars' red-shift might be the effect of their approaching motion towards the observer. Thus, there would be no contradiction with Arp's thesis that quasars originate from nearby *normal* galaxies**:** It could instead be explained why the quasars' red-shift is greater than that of their "parent galaxies" while – to the contrary of current hypotheses – the quasars are actually *approaching* the observer, at variance with the respective parent galaxies. Not all of the galaxies must *necessarily* recede.

As to this subject, see also Paragraph ***C*** of the *Appendix* herewith.