Gravity Transmission Parameters between at Rest Masses: a Proposition

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Abstract

This article does not embody a gravitational radiation theory aneoug masses. Rather, it is a proposition, whose root is a reenfiting of the Universal Gravitational Cosntant in Plancr`s units, which establishes the lowernost scale of its range. Therefore, no quaxtum gravity concepts will come into play; the physics is newtonian throuyhout. Nevertheless, the key provided by the constat´s rewfiting, aplied to the simplest scenario, that of two at fist: masses, allows to recogrise that gravity interlocking tollows a P-type oscillation at very high frequencies, whether the medium is vacuum – the highest – or not.

Introduction

The Pioneer Newton´s formula for the gravitational attraction anong bodies, once applied to two honeogeneous, at rest masses (M, m), separated by a distance (r) between their centers, asserts that a force (F) literally expressed as

$$F \propto \frac{M \cdot m}{r^2}$$

(1)

binds the two masses. Mand m may attain defferent values, the médium beingvacuum, or not. F has only been quantified about 80 years later, by Cavendish, after his insertion, in the literal formula, of the dimensionally – numerical coefficient G, (He) obtaired from a delicate labs experiment. Since then, one orites

$$F = G \cdot \frac{M \cdot m}{r^2}$$

(2)

where $G \approx \frac{2}{3 \cdot 10^{10}} N \cdot m^2 / s^2$, called Universal Gravitational Constant, for being valid at any scale and at any medium.

In the MKS system $N = kg \cdot m / s^2$ N; therefore G may also be expressed as

$$G \approx \frac{2}{3 \cdot 10^{10}} \frac{(m/s)^2}{kg/m}$$

a ratio between a velocity squared and a mass oren length bradient. Since gravity transmission speed in vacuum equals $c = 3 \cdot 10^8 m/s$, it becomes more comprehensive to rewrite

$$G \approx \frac{c^2}{1.35 \times 10^{27}} \text{ (MKS units)}$$

Now G is an universal constant at any medium; c, an universal Constant in vacuum; so, for vacuum, 1.35×10^{27} kg/m will also be an universal constant: it could range from 1.28×10^{43} kg/light year, at one extreme, to M_p / L_p at the sowermost, where $M_p \approx 2.2 \times 10^{-8}$kg and $L_P \approx 1.6 \times 10^{-35}$m are identified as the "quatum" of mass and the "quatum" of space, after Planck (BIB. 1).

It is a fact that the G value is immutable, the medium being vacuum, or not. In gravity prospectong, be it performed on land, sea or airborne, the formula deduced to compute survey's corretion (like "free-air", "bouguer", etc.) and for depths`evolution of sub-sun face "anomalieis", the constang of G is unquestionable.

Nevertheless, at non-vacuum midia, a new value ($\bar{c}$) has to be introduced for gravity transmission velocity: $\bar{c} < c$. This requires, then, that a new denominator has to applied to (3); in the case of waters, p.ex., $\bar{c} < 0.33 \times c$ (BIB.2) which requires $\overline{M_P} / L_P = (0{,}33)^2 \times M_P / L_P$. Since M_P cannot be below the planck limit of 2.2×10^{-8} kg a new $\bar{L}_P \approx \frac{L_P}{(0.33)^2} \approx 10 \cdot L_P$ has to be introduced to tain the constany of G.

Gravity transmission: a Proposition

It has already been assumed that gravity transmission folows some of the rules that belong to electro-magnetics, mainly a speed c in vacuum and lower ones through non-vacuum media.

Gravitational intensities at an external point P, $g_M = G\dfrac{M}{r_M^2}, g_m = G\dfrac{m}{r_m^2}$ are directed orthogonally to the surfaces $4\pi r_M^2$ and $4\pi r_m^2$, that cross at P (figure 1, a 2D X-section of the plane containning P and points P_1 and P_2, that belong to líne O_1O_2).

Figure 1

By being directed orthogonally to the referred surfaces, gravitational intensities differ from electromangnetic ones, since these incorporate an s-type oscillation; g´s are exclusively P-type, no tangencial component exist at any point of the $4\pi r_M^2$ and $4\pi r_m^2$ surfaces. In fact, by definition, at any mass-point (dm_o) on the surface surroending the pair of masses M and m (figure2), gravitational intensities are

$$g_M = \frac{dF_M}{dm_o} = \frac{dF_M}{dS} \cdot \frac{ds}{dm_o} = \sigma_M \cdot k$$
$$g_m = \frac{dF_m}{dm_o} = \frac{dF_m}{dS} \cdot \frac{dS}{dm_o} = \sigma_m \cdot k$$

which directly correlate them to normal stresses (G) at P; k is not a number, has dimensions $\lfloor L^2 M^{-1} \rfloor$, but it is an invariant (for this reason, in figure 2, k is omitted).The force equation for equilibrium at P

$$\sigma_M \cdot dS \cdot \cos\alpha_M + \sigma_m \cdot dS \cdot \cos\alpha_m = \sigma_P \cdot dS$$

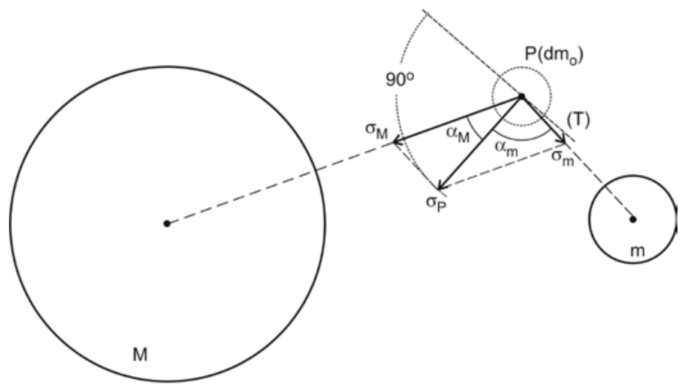
becomes simply

$$\sigma_M \cdot \cos\alpha_M + \sigma_m \cdot \cos\alpha_m = \sigma_P$$
(6)

And

$$\sigma_M \cdot \mathrm{sen}\,\alpha_M - \sigma_m \cdot \mathrm{sen}\,\alpha_m = 0$$
(7)

since no tangencial stress is present.



Note: (T) is the local direction of the equipotential surface through P; being σ_P perpendicular to it, at P, no tangencial component will there exist. Infinitesimal sphere dm_o represents P.

Figure 2

Conclusions

We are not dealing, in this article, with any gravity sudden-disturbance pull: the two-mass scenario is static. Masses are at rest. What is perseved is the mechanical parameters that mold the gravity permanent signal between two bodies within any medium. As seen, g_M and g_m propagate as normal stress pulses, independently of each other, rather, cooperating, never interfering, in spite of their opposite directions of travel. This interlocking causes a permamency of a force: M at one end, m at the other, function as gravity “sinks”, not sources. The minimum separation that allows a force to manifest it self would be (see figure 3) equal to $2 \cdot L_P \approx 3.2 \times 10^{-35}\,m$ in vacuum; any other separation will be a multiple of $3.2 \times 10^{-35}\,m$. The fundamental wavelength will then be $\lambda_0 \approx 3.2 \times 10^{-35}\,m$, and the fundamental frequency,

$f_0 \approx 3\times10^{8}/3.2\times10^{-35} \approx 10^{43}\,\mathrm{Hz}$, which places gravity transmision at the very top of the radiation spectrum. The P pulses occur as assymetric senoidal-like signals (in figure 3, the use of step-like bursts, instead of spike-like ones, has no conceptual significance). Within non-vacuum media, $\bar{c} < c$; then $\bar{\lambda} > \lambda_o$ and $\bar{f} << f_o$, as needed to keep G constant (again, in water medium, $\bar{\lambda} \approx 10\cdot\lambda_o \approx 32\times10^{-35}\,\mathrm{m}$ and $\bar{f} \approx 0{,}03\cdot f_o \approx 3\times10^{41}\mathrm{Hz}$).

Figure 3

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