

MAGNETISM AND GRAVITY ARE THE SAME THING

by

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ABSTRACT

The article discusses the still unresolved problem of the origin of the Earth's magnetic field and of other celestial bodies, which is shown to be due to the mass moment of the observed celestial body, identifying magnetism as the manifestation of gravitation. It is found experimentally that magnetism appears to be the strong gravitational interaction of the mass moments identified experimentally with the magnetic moments of the ferromagnetic materials.

INTRODUCTION

The title of this article is the exact quotation from the third sentence of the **EDITORIAL** entitled **The Politics of Gangsterism at Farris** (main Engineering building on the UNM campus named after the former Engineering Dean Farris) of the May 14, 1974 issue of the student newspaper **LOBO** of the University of New Mexico (UNM), Albuquerque, New Mexico, USA supporting this author against the UNM Administration intention to retire this author, then age 48, involuntarily. That **LOBO** article can be found on the Internet Site <http://jovandjuric.tripod.com> The UNM students writing for **LOBO** clearly understood and obviously approved the research interest of this author to investigate the basic tenets of physics. The theoretical position of this author is clearly postulated in his the 5th award winning paper entitled **Gravitation and Electromagnetism** in the 1963 competition of *the Gravity Research Foundation*. That award winning paper was offered for publication to all well-known scientific physics journals, but it was rejected without comments and never published in any scientific journal.

It is obvious that the scientific community took the very hostile stand against the idea of the unified field theory of this author based on the symmetrical Maxwell equations unifying gravitation and electromagnetism as postulated in his mentioned award winning paper, which obviously challenges the general theory of relativity as the absolutely unnecessary **new** theory of gravitation. The classical Newton's theory of gravitation can be logically very much widened, completed and logically unified with electromagnetism by the simple introduction of the definition of the center of self gravitation combined with the shift of the coordinate origin of the geophysical coordinate system as shown by this author in many his papers all available on his Internet Site <http://jovandjuric.tripod.com>

PROBLEM

Sir Isaac Newton (1642-1727) defined in his famous theory of gravitation only the center of mass of a body, and for the calculations of the trajectories of the planets in our

planetary system, the planets are defined as the point masses at their mass centers, which is a perfect approximation for that purpose. However, the problem arose when the center of mass of the Earth was used and is still used as the coordinate origin of the geophysical coordinate system used for the investigation of the Earth. By definition, the Earth's mass moment is zero in such a geophysical coordinate system. Consequently, the second term in the series approximation of the Earth's gravitation due to the Earth's mass moment is zero in that coordinate system, but it is certainly not zero in any other coordinate system, since **the Earth is obviously not spherically absolutely symmetrical**. This is a very serious problem, requiring a very large number of terms in that series approximation to offset and compensate the missing term due to the missing Earth's mass moment. The short paper of this author entitled **GEOPHYSICAL COORDINATE SYSTEM** [1], which analyzes and treats this problem, is attached at the end to this paper in order to shorten this paper. It should be mentioned that using the analogous solar coordinate system, whose coordinate origin is at the point where the Sun's self gravitation is zero, the very logical analysis and explanation of the solar cycle is obtained, v. [2].

RESOLUTION

Due to the inadequate geophysical coordinate system, which is still used, the physically really possible problem of the obviously present gravitational interaction of a **pivoted** mass object having the observable mass moment with the Earth's mass moment cannot be analyzed in the present theoretical mechanics. Namely, it is shown in the experiments by this author that a pivoted needle made of wood or any other non-ferromagnetic material assumes after some slow oscillations the direction identical to the needle of an ordinary magnetic compass. The analysis of that problem is practically impossible in the present classical mechanics. However, the actual calculation of the torque acting on the pivoted mass object in the Earth's gravitational field using strictly the Newton's classical theory of gravitation but in the geophysical coordinate system, whose coordinate origin is at the point of zero gravity of the Earth (center of self gravitation), can be found in [3]. Actually, that gravitational interaction of the mass moment of a pivoted mass object with the Earth's mass moment is proved by the mentioned gravitational experiment of this author to be the real origin of what is known as the Earth's magnetic field, v. [3]. **So, as proved experimentally, magnetism actually and strictly appears to be the strong gravitational interaction between the mass moments experimentally identified as the magnetic moments of the certain materials called ferromagnetic.**

It is strange that during the extensive experiments of many well-known scientists in search of the effects called magnetic fields created by the electrical currents at the beginning of the 19th century following Hans Christian Oersted's (1777-1851) discovery in 1819, that the electrical current circuit causes the movement of the needle of the magnetic compass, not a single experimenter paid any attention to the fact that in the experiments with the pivoted needles, the Earth's gravitational field was balanced and eliminated only at the actually one contact point of pivoting, but due to **the inevitable non-uniformity of that Earth's gravitational field**, the testing object is subject to the actual Earth's gravitational field from which its value at the contact point must be

deducted. Thus, the testing object is subject to what appears as a non-monopolar gravitational field from which its main value at the point of pivoting is deducted due to pivoting and identified as and called the magnetic field of the planet Earth in reality.

SOME FACTS

The pivoting of the needle in a magnetic compass is essential, without which that needle obviously falls down in the Earth's gravitational field. In fact, **all** experiments involving the magnetic fields take place in the inevitable gravitational field, which is obviously balanced by the contact force, and **carelessly** dismissed, as though it does not exist, without paying any further attention to that inevitable gravitational field, which is certainly non-uniform to some extent. While such an attitude was certainly understandable for the ancient experimenters, presumably Chinese, who discovered the magnetic compass many millenniums ago, - the magnetic compass was brought to Greece from China by the ancient travelers well before the New Era, i.e., Christ - and perhaps understandable to some extent, particularly even up to the year 1895, but when in 1895 Pierre Curie (1859-1906) reported that magnets lose their magnetic property after being heated above now known as the Curie point, with the inevitable consequential conclusion that the Earth cannot be a permanent magnet as believed up to that time, such attitude of **all** scientists of that era was unpardonable and only showed their interest for fame and reputation, not for **the uncompromising search for the scientific truth.** Many famous scientists of that era rushed into the research of microcosm obtaining even some very interesting results, while leaving the very obvious **unresolved macroscopic problem of the cause of the origin of the conventional Earth's magnetic field, which is certainly very, very important for the true understanding of any microscopic problem.** That problem remains still unresolved, since the present rulers of science and the editors of the scientific journals ignore and reject the experimental and theoretical results of this author without any comments. The strangest appears to be the decision in 2009 of the Editor of the physics journal *Il Nuovo Cimento C* Professor Arnaldo Longhetto to reject the paper **GRAVITATIONAL EXPERIMENT** of this author because that experiment was performed at home, not at a certified laboratory!!! **Galileo would have been very much amazed at such a decision, since that gravitational experiment is essentially the actual completion of his, Galileo's experimental work.**

ABSURDITY

Due to the still unresolved problem of the origin of the Earth's conventional magnetic field, which actually leads to **the true identification of magnetism as the manifestation of gravitation** according to the experimental and theoretical results of this author, which are totally ignored by the present rulers of science, the enigma of the existence of the magnetic moment of the electrically non-charged elementary particle neutron is presumably "resolved" by the **absurd hypothetical subatomic** (!!!) particle called quark, thus violating logic and the atomic hypothesis, v. [4]. The Nobel Prize was awarded absurdly for that quark hypothesis, which appears to have been "inspired" (!) by the surrealistic novel of the late James Joyce (1882-1941), and also absurdly the Nobel Prize for its, quark's, presumed experimental confirmation of existence!!!

CONCLUSION

The mass moment identified experimentally by this author as the conventional magnetic moment with the appropriate multiplying factor **is** the natural inevitable property of any particle or mass object, including neutron, existing **always** in some external by all means non-uniform gravitational field, and **never** perfectly spherical regardless how small or large it is. **Hence, the quark hypothesis is absolutely unnecessary, beside being logically absurd.** But the rulers of the present international scientific community and the editors of the scientific journals appear to be only the politicants (politicant is a derogatory Serbian word for politician, who is always for compromise, seldom, if ever, for absolute truth) and/or the charlatans or *the learned ignoramuses* (the derogatory term used by the famous Spanish philosopher the late José Ortega y Gasset (1883-1955) in his famous book *The Revolt of the Masses*) as this author must conclude.

NOTE

It is highly hypocritical and cynical of the western countries-democracies, including Serbia, the country of the birth of this author, and including the USA, the country of the naturalization of this author, to brag about freedom, while the obvious scientific truths discovered by this author remain unpublished for obvious political reasons. **The existence of the list** maintained on the Internet Site <http://editionssailly.com> by the **Jean de Climont associates Ltd of about 7 000 (seven thousand) of the so called scientific dissidents, who consider the theory of relativity, particularly general, wrong and unnecessary, is truly amazing and absolutely frightening!** It is absolutely inadmissible and the extreme violation of freedom to single out any person for his/her opinion and/or belief on any issue, and to call that person by some names, like dissidents, and to put his/her real name on a list of the presumed shame!

REFERENCES

1. Djuric, J., *Geophysical Coordinate System*, offered for publication and available on the Internet Site <http://jovandjuric.tripod.com> , also attached at the end of this paper in order to shorten this paper
2. Djuric, J., *Feedback in Gravitational Problems of Solar Cycle and Perihelion Precession of Mercury*, available on the Internet Site <http://jovandjuric.tripod.com>
3. Djuric, J., *New Theory of the Earth's Magnetic Field*, offered for publication and available on the Internet Site <http://jovandjuric.tripod.com>
4. Djuric, J., *Atomism and Logic*, offered for publication and available on the Internet Site <http://jovandjuric.tripod.com>

ATTACHED

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ABSTRACT

This short paper deals with the peculiar approximation problem in geophysics, that in the presently exclusively used geophysical inadequate coordinate system, whose coordinate origin is defined to be at the center of mass of the Earth, the International Gravity Formula must be used with one flattening for the Northern hemisphere and the different flattening for the Southern hemisphere. It is suggested in this paper, that a new geophysical coordinate system should be defined, so that a new gravity formula in reference to that new geophysical coordinate system may contain in itself the obvious additional dependence of the Earth's gravity on the geographic latitude, and thus be applicable for the entire Earth without any reference to the different flattenings. The new geophysical coordinate system is proposed in this paper. The similar coordinate systems must be used in all planetary, solar and stellar problems.

INTRODUCTION

The International Gravity Formula as defined in the presently exclusively used geophysical coordinate system is given by the expression (see [1], p. 79)

$$g = 9.780490(1 + 0.0052884 \sin^2 \lambda - 0.0000059 \sin^2 2\lambda) \quad m/s^2, \quad (1)$$

where λ is the geographic latitude. It is obvious that this Formula contains only the monopolar term of the Earth's gravity. The second term in the parenthesis is due to the rotation of the Earth, while the third term is assumed for fitting. This Formula (1) does not show explicitly the dependence on r and φ , but the flattening $f^{-1} = 298.5$ must be used for the Northern hemisphere, and the flattening $f^{-1} = 297.3$ for the Southern hemisphere (v. [1], p. 79). This fact suggests that some form of the dipolar term of the Earth's gravity should be present in the generally applicable Earth's gravity formula.

GENERAL EXPRESSION OF THE EARTH'S GRAVITY

The Earth's gravitational potential in the general coordinate system is given by the expression (see [2], or any comprehensive mechanics textbook)

$$U_E = G \iiint \frac{\rho_{VE} dV'}{|\vec{r} - \vec{r}'|}, \quad (2)$$

where $G = 6.67 \times 10^{-11} \text{ kg}^{-1} \text{ m}^3 \text{ s}^{-2}$ is the gravitational constant, ρ_{VE} is the volume mass distribution of the Earth and the vector \vec{r} defines the point of observation. Retaining

only the two terms in the Taylor development, for the point of observation on or outside the Earth it becomes

$$U_E = \frac{GM_E}{|\vec{r}|} + \frac{G\vec{M}_{1E} \cdot \vec{r}}{|\vec{r}|^3} \quad (3)$$

M_E is the mass of the Earth, while \vec{M}_{1E} is the first mass moment of the Earth, also called the dipolar moment of the Earth.. They are given by the expressions

$$M_E = \iiint \rho_{VE} dV' \quad , \quad (4)$$

and

$$\vec{M}_{1E} = \iiint \rho_{VE} \vec{r}' dV' \quad . \quad (5)$$

It should be emphasized at this point that the next term in the Taylor development of the Earth's gravitational potential is divided by the radius r , and in view of the Earth's radius of 6.37×10^6 m, its contribution on the surface of the Earth is quite negligible.

The Earth's gravitational field on the surface or outside the Earth is by definition

$$\vec{g}_E = -\nabla U_E = \frac{GM_E \vec{r}}{|\vec{r}|^3} - \frac{G\vec{M}_{1E}}{|\vec{r}|^3} + \frac{3G(\vec{M}_{1E} \cdot \vec{r})\vec{r}}{|\vec{r}|^5} \quad (6)$$

DISCUSSION

In the presently used geophysical coordinate system the first mass moment of the Earth is by definition zero, and the approximate gravitational potential of the Earth contains only one term, the first monopolar term in the Equation (3), and only the first monopolar term in the Equation (6) for the Earth's gravitational field. In fact, the International Gravity Formula (1) is obtained by using only the first monopolar term of the Earth's gravitational field in the Equation (6).

As mentioned in connection with the International Gravity Formula, the flattening for the Northern hemisphere is different from the flattening for the Southern hemisphere, which implies that the so-called dipolar term due to the mass moment must be used in order to obtain the correct general gravity formula. The two additional terms in the Equation (6) are due to the obvious Earth's mass moment. In view of the form of the Earth and depending on the Earth's first mass moment, it must contain a horizontal component beside the radial component, which is very interesting. The third term in (6) is only radial, just as the first monopolar term.

The only way to take into account the first Earth's mass moment in the expression for the Earth's gravitational field is to define a new geophysical coordinate system whose coordinate origin is not the center of mass of the Earth. Indeed, the conventional geophysical coordinate system is quite peculiar, since its coordinate origin - the center of mass of the Earth - cannot be determined experimentally even in principle, since its

experimental determination necessitates the strictly uniform external gravitational field stretching infinitely, and such a field does not exist in nature. The inaccuracy of the position of the coordinate origin of the conventional geophysical coordinate system of only 10 meters, which is very small compared to the Earth's radius and quite plausible and probable, such inaccuracy changes the 5th decimal figure in the IGF, Equation (1).

It is quite clear that the presently used geophysical coordinate system is very inadequate for the accuracy, and it excludes totally without any justification whatsoever the impact and the effect of the first mass moment in the various physics problems, particularly the gravitational problems, by the arbitrary and quite inappropriate choice of its coordinate origin. A new geophysical coordinate system must be defined.

PROPOSAL

It is obvious that the only point inside the Earth, which has a physical meaning beside the Earth's center of mass, is the point at which the Earth's gravitational field is zero. Such a point certainly exists inside the Earth and can be determined experimentally in principle. That point does not coincide with the Earth's center of mass. Namely, the center of mass of the Earth is defined in the general coordinate system by the expression

$$\vec{r}_{cmE} = \frac{1}{M_E} \iiint \rho_{VE} \vec{r}' dV' \quad , \quad (7)$$

while the point at which the Earth's gravitational field is zero, named the center of gravitation of the Earth \vec{r}_{sgE} is the solution of the integral equation

$$\vec{g}_E(\vec{r}_{cgE}) = 0 = G \iiint \frac{\rho_{VE} (\vec{r}_{cgE} - \vec{r}') dV'}{|\vec{r}_{cgE} - \vec{r}'|^3} = 0 \quad . \quad (8)$$

It is clear from these two Equations (7) and (8) that the center of mass of the Earth and the so-called center of gravitation of the Earth are two distinctly different points, except in the case of the absolute perfect symmetry of the Earth, which is not the case.

The first mass moment of the Earth with respect to the center of gravitation of the Earth should be called the intrinsic mass moment of the Earth, since that first mass moment of the Earth is absolutely unique and quite significant as the measure of the deviation of the form of the Earth from the perfect sphere.

It must be emphasized at the end of this paragraph that the similar coordinate systems with the coordinate origins at the respective centers of gravitation of the observed mass objects must be used in all planetary, solar and stellar problems,

CONCLUSION

It is obvious that there is a serious problem of approximation in geophysics, since the conventional geophysical coordinate system with its coordinate origin at the Earth's center of mass is definitely inadequate. The above proposed new geophysical coordinate system with its coordinate origin at the center of gravitation of the Earth should resolve that problem. The general gravity formula for the Earth must include beside the Equation

(6) the centrifugal acceleration due to the rotation of the Earth. The determination of the new general gravity formula must be the subject of another paper.

REFERENCES

1. Heiskanen, W. A. and Moritz, H., *Physical Geodesy*, W. H. Freeman and Company, San Francisco, California, U.S.A., 1967
2. Kellogg, O. D., *Foundation of Potential Theory*, Springer, 1929