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Theory of Electromagnetism and Gravity

—Modeling Earth as a Rotating Solenoid Coil

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Abstract

Presented in this manuscript are conventional electrical engineering tools to model the earth as a rotating electrical machine. Calculations using known parameters of the earth and measured field data has resulted in new understanding of the earth's electrical system and gyroscopic rotation. The material makeup of the inner earth is better understood based on derived permeability and permittivity constants. The planet has been modeled as simple coils and then as a parallel impedance circuit which has led to fundamental insight into planetary speed control and RLC combination for Schumann Resonance of 7.83 Hz. Torque and Voltage Constants and the inverse Speed Constant are calculated using three methods and all compare favorably with Newton's Gravitational Constant. A helical resonator is referenced and Schumann's Resonant ideal frequency is calculated and compared with others idealism. A new theory of gravity based on particle velocity selector at the poles is postulated. Two equations are presented as the needed links between Faraday's electromagnetism and Newtonian physics. Acceleration and Deceleration of earth is explained as a centripetal governor. A new equation for planetary attraction and the attraction of atomic matter is theorized. Rotation of the earth's electrical coil is explained in terms of the Richardson effect. Electric power transfer from the sun to the planets is proposed via Flux Transfer Events. The impact of this evolving science of electromagnetic modeling of planets will be magnified as the theory is proven, and found to be useful for future generations of engineers and scientists who seek to discover our world and other planets.

Keywords

Ampere, Biot-Savart, Centripetal Acceleration, Centripetal Governor,
Dynamo, Earth, Einstein-de Haas Effect, Electric Field, Electromagnetism,
Flux Transfer Events, Governor Control, Gravity, Gravitational Constant,
Helical Resonator, Lenz Law, Lorentz, Lightning, Magnetic Field, Motor

Constant, Parallel Impedance, Planet, Speed Control, Schumann Resonance, Richardson Effect, Solenoid, Speed Constant, Solar Power System, Torque Constant, Velocity Selector, Voltage Constant

1. Brief History of Earth Magnetic Field and Gravity

The great problem of the earth's magnetic field was first postulated as a giant bar magnet by William Gilbert (1544-1603) in his book *De Magnete* [1]. It was this book which inspired Galileo Galilei (1564-1642) who determined the earth rotated around the sun and was claimed to have performed his historic experiments of gravity from the Tower of Pisa [2] [3]. Galileo's work in turn led to Isaac Newton (1643-1727) writing the infamous *Principia Mathematic* describing the laws of universal laws of motion [4]. Later, scientific consideration of the earth magnetic field was experimentally confirmed in 1838 when Carl Fredrich Gauss (1777-1855) used spherical harmonics to prove that almost the entire magnetic field was to be of internal origin [5]. Michael Faraday (1791-1867) wrote a paper in 1851 titled, "*On the possible relation of gravity to electricity*" [6]. Shortly after writing his special relativity paper in 1905, Albert Einstein (1879-1955), he described the problem of the origin of the earth's magnetic field as being one of the most important unsolved problems in physics. In 1919, the British physicist Sir Joseph Larmor (1857-1942) was the first to postulate the Sun's magnetism to a dynamo effect in analogy to conventional rotating generators of an electrical power station [7] [8]. Nikola Tesla (1856-1943) in preparation for a speech made a written statement in 1938 alluded to a theory of gravity and referred to forces and motion of heavenly bodies; but no theory was ever published. Quotes by Tesla regarding the earth being regarded as an "electric machine" or "solenoid" are noted, but a definitive source is not established by the author. The pivotal article "*The Earth as a Dynamo*" which first modeled the earth as a Faraday Disc (rotating machine) was published by *Scientific American* in May 1958 by renowned physicist Dr. Walter M. Elsasser (1904-1991) [9]. Many more recent scientists have progressed the understanding of the earth magnetic field using satellite imagery and computer modeling.

2. Introduction

The magnetic field of the earth is continually being addressed by geophysicist and scientist of multiple disciplines. This theoretical paper is a collection of idea's that is intended to explain the workings of the earth and solar system in electrical engineering parlance. The author's life experience is admittedly limited to his area of technical discipline, so it is likely to stir debate among scientist, geophysicist, astrophysicist and engineers. There are no disclaimers in theoretical research so the success or failure of the theory, in part or in full, is solely the authors. Discourse and controversy over new ideas which appear to depart from

the norm is the nature of meaningful technical progress. However, upon careful examination it will be demonstrated that the work presented in this paper does not conflict with existing geophysical theories of the earth. The paper does attempt to expand on the foundational work of National Medal of Science winner Dr. Walter M. Elsasser who is considered the "*father*" of the electric dynamo theory. It is the author's opinion that the electrical engineering concepts presented add to the body of work and complement the existing geophysical theories.

The modus of operandi, and contribution, of this manuscript has been to consider our solar system as an electrical power system. From this perspective, the massive sun is viewed as a rotating electrical power generator providing electromagnetic energy to the planets which act as rotating machines, or electric dynamos. By imagining such a balanced energy system from afar this paper attempts to achieve a broader understanding of the universe as a system of solar systems, or power systems. Electromagnetism using flux transfer thru aether, is the universal life force that interconnect energy and matter. Citations to articles pertaining to Flux Transfer Events between the Sun and the planets are included in the reference section which advances the novel concept of transformer action between the sun and the earth. The author believes that the Suns electromagnetic energy is an additional energy source to the earth via Flux Transfer Events. Flux Transfer Events may be the catalyst for sustained nuclear reaction and geodesic synchronicity, but this is purely conjecture. Speed of a motor is proportional to supply frequency and it is thought that the timing and duration of Flux Transfer Events may be the determining factor in setting the speed of the planetary rotation.

Reported herein are simple electrical engineering models of the earth and applying well known laws of Faraday, Lorentz, Biot-Savart and others. Three alternative magnetic fields are considered-simple loop, toroid and stacked coils which are represented as a solenoid. Using measured data of the earth's magnetic field the loop coil equation derives the total earth current. These values are then inserted into the toroid and solenoid model for comparison and calculations of the relative permeability of the earth. Rotational EMF calculations are generated for various latitudes to better understand the voltage gradient of the electric field that surrounds the earth. Torque, Voltage and Speed Constants are calculated and compared to Newton's Gravitational Constant. The earth's rotation due to the Richardson effect with rotating coils and DC commutation with the electric field at positive and negative poles is postulated. Using an RLC circuit the earth is modeled as a constant speed machine. Schumann Resonance is a known derivative of lightning and is calculated based on a permittivity of 1.1. It is then ideally calculated for a helical resonator model. The approximate electrical power of the earth is presented as well as other characteristics of the earth explained. The pole regions are a matter of keen interest as calculations suggest that deceleration through the electric field and magnetic field bending are the

mechanism for particles and electromagnetic waves and its potential relationship to gravity. Like the RLC circuit which controls the resonant frequency of the earth, the electromagnetic field works as a velocity selector to filter out fast and slow particles and let through when $v = E/B = 7920 \text{ m/s}$, which when moving in a circle equates to an acceleration of 9.8 m/s². The electromagnetic circuit of the earth works hand in hand with the electromagnetic circuit of the atmosphere. Known Flux Transfer Events that establish a "magnetic rope" between the Sun and the Planets is explained in simple electrical engineering terms as an additional source of sustainable electrical energy that continually powers the earth's electromagnetic field, heats the core, and provides motoring torque that rotates the earth.

3. Geo-Dynamo Theory

Per the US Geological Services, a scientific division of the Bureau of Reclamation, "The earth's outer core is in a state of turbulent convection as the result of radioactive heating and chemical differentiation. This sets up a process that is a bit like a naturally occurring electrical generator (or motor), where the convective kinetic energy is converted to electrical and magnetic energy. Basically, the motion of the electrically conducting iron in the presence of the Earth's magnetic field induces electric currents. Those electric currents generate their own magnetic field, and as the result of this internal feedback, the process is self-sustaining so long as there is an energy source sufficient to maintain convection." [10] (**Figure 1**).

"The combination of convection and rotation produces the complex motion needed for self-excited dynamo action. The rotation effectively stretches the poloidal field into toroidal field lines (the w-effect). Most geo-dynamo models require a strong toroidal field, about 0.01T, (or 100 Gauss), even though this field
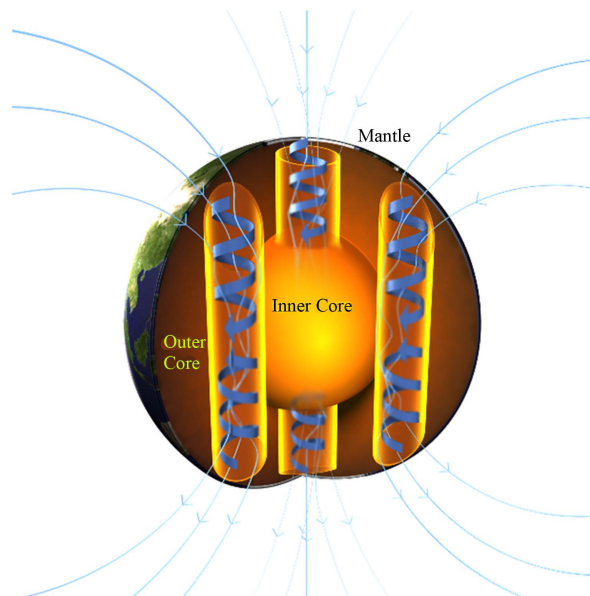

Figure 1. Earth as a dynamo.

cannot be observed at the Earth Surface. The toroidal field lines are warped up or down due to the radial convective flow (assuming 'frozen flux'); because of the Coriolis force this results in helical motion, which, in fact, recreates a poloidal component from a toroidal one (this is known as the alpha effect). The rotation controls the motion in such a way that the dipole field is stronger than any other poloidal component and, averaged over a sufficient time, coincides with the Earth's rotation axis." "The basic idea behind the geo-dynamo is that the rapid motion of part of the liquid (metallic iron) in an ambient magnetic field generates a current that induces a secondary magnetic field which is largely carried along in the fluid low ('frozen flux') and which reinforces the original field. In principle, this concept can be illustrated by Faraday's disc generator." [11]

Shown below is a typical Faraday Disc generator with magnetic field represented (Figure 2). Electrical engineers are schooled early with the notion that every generator is a motor, and every motor is a generator. Changing the polarity of a Faraday Disc, or reversing rotation is used to teach this elementary concept. The Faraday Disc, designed by Michael Faraday (1791-1867) was one of the first rotating electrical machine, from which Thomas Edison, Nikola Tesla, and Dr. Werner von Siemens (who first coined the term electro dynamo) evolved their electrical DC and later AC machines that advanced the world.

4. Field at Center of Loop

A current carrying loop is known to produce a magnetic field in the same direction as shown below (Figure 3).

The Biot-Savart law determine the magnetic field and becomes

$$\mathrm{d}B = \frac{\mu_0 I \mathrm{d}L \times \hat{r}}{4\pi R^2} = \frac{\mu_0 I \mathrm{d}L \sin\theta}{4\pi R^2}$$
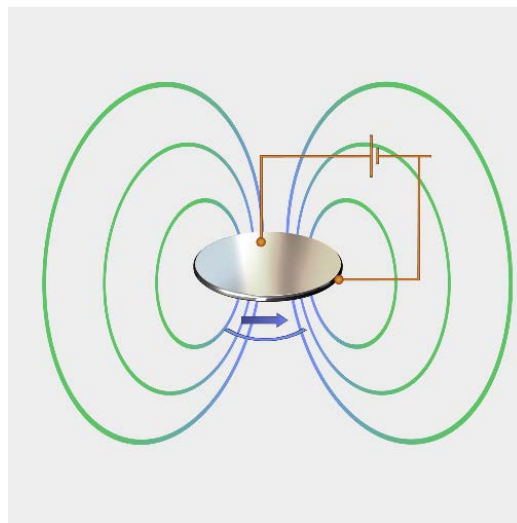
The integral at 90 degrees becomes
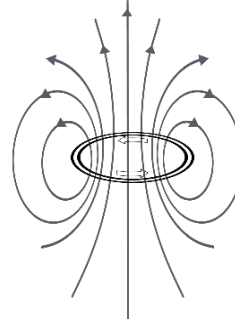

Figure 2. Faraday disc.

Figure 3. Simple loop.

$$B = \frac{\mu_0 I}{4\pi R^2} \oint dL = \frac{\mu_0 I}{4\pi R^2} 2\pi R = \frac{\mu_0 I}{2R}$$

$$\mu_0 = 4\pi \times 10^{-7} \text{ T} \cdot \text{m/A}$$

Integrating the z-component of the Biot-Savart law on the centerline of a current loop (**Figure 4**)

$$dB_z = \frac{\mu_0 I dL}{4\pi} \frac{R}{\left(z^2 + R^2\right)^{3/2}}$$

The magnetic field is then

$$B_Z = \frac{\mu_0}{4\pi} \frac{2\pi R^2 I}{\left(z^2 + R^2\right)^{3/2}}$$

The field element labeled dB_x rotates around as you progress around the loop, and by symmetry gives a net zero field for the loop. The field at this point is in the z-direction, along the centerline of the loop.

$$dB = \frac{\mu_0}{4\pi} \frac{I dL}{r^2}$$

$$r^2 = z^2 + R^2$$

Substituting

$$dB_z = dB \sin \theta$$

And

$$\sin \theta = \frac{R}{\sqrt{z^2 + R^2}}$$

Gives $dB_z = \frac{\mu_0 I dL}{4\pi} \frac{R}{\left(z^2 + R^2\right)^{3/2}}$

For a current $I = 1.73 \times 10^9 \text{ A}$ and loop radius $R = 6 \times 10^6 \text{ m}$, the magnetic field at the center of the loop is $B = 1.704$ Gauss.

At a distance $z = 6.378 \times 10^6 \text{ m}$ out along the centerline of the loop, the axial magnetic field is $B = 0.603$ Gauss.

The current of 1,730,000,000 is the total current. So, for a coil of N turns, the current used is Ni where i is the current supplied to the coil. We set $N = 9.8$

turns for our calculations. "An average lightning strike discharges about 30,000 amperes (20,000 amperes in the UK). NASA has recorded strikes of 100,000 amperes and there are other reports of strikes over 200,000 amperes." [12]

The magnetic field of the earth ranges from 1.7 Gauss at the center of the earth to 0.60 Gauss near the surface. These values compare favorably with measured values at the earth's surface of 0.25 to 0.65 Gauss.

5. Calculate Torque Constant (Figure 5)

$$\text{Force} = \text{Current} \times \text{Length} \times B\text{-field}$$

For current $I = 1.73 \times 10^9 \, \text{A}$ and $L = 4.0075 \times 10^7 \, \text{m}$ positioned perpendicular to a magnetic field $B = 0.6 \, \text{Gauss}$ the force is

$$F = 0.416 \times 10^{13} \, \text{N}$$

If the angle between the current and magnetic field is 90° the force $F = 0.416 \times 10^{13} \, \text{N}$.

If a force of magnitude $F = 0.416 \times 10^{13} \, \text{N}$ is applied at a distance $r = 6.38 \times 10^6 \, \text{m}$ from the axis of rotation in an orientation where r makes the angle $\theta = 78.5°$ with respect to the line of action of the force, then the lever arm $= 6.25 \times 10^6 \, \text{m}$ and the magnitude of the torque is

$$\tau = 2.6 \times 10^{19} \, \text{N} \cdot \text{m}$$

$$K_t = \frac{\text{Torque}}{\text{Current}}$$

$$K_t = \frac{2.6 \times 10^{19} \, \text{N} \cdot \text{m}}{1.73 \times 10^9 \, \text{Amps}}$$

$$K_t = 1.503 \times 10^{10}$$

$$K_s = \frac{1}{K_t}$$

$$K_s = \frac{1}{1.503 \times 10^{10}}$$

$$K_s = 6.654 \times 10^{-11}$$

We can then compare to Newton's Gravitational Constant

$$G = 6.674 \times 10^{-11}$$

Percent error is less than 1%.

For confirmation, we will next calculate the Rotational Emf and Voltage Constant as we know that the Torque Constant is equal to the Voltage Constant and they both are equivalent to the inverse of the Speed Constant

$$K_s = \frac{1}{K_e} = \frac{1}{K_i}$$

6. Rotational EMF (Figure 6)

Generated Rotational Emf occurs when a conductor moves through a magnetic

field. The magnetic force is result of Faraday's Law. If the entire length of wire moves through a uniform field, the voltage is given below:

$$emf = vBL\sin\theta$$

Or

$$emf = vBL \quad \text{if } \theta = 90$$

The magnetic field is estimated to be 0.60 Gauss. The angle between rotation axis and magnetic field is approximately 11.5 degrees.

$$\text{Generated voltage} = emf = \text{Velocity} \times B\text{-field} \times \text{Length}$$

For a wire of length $L = 0.401 \times 10^8 \,\text{m}$, moving with velocity $v = 465.1 \,\text{m/s}$ perpendicular to a magnetic field $B = 0.6 \,\text{Gauss}$, the generated voltage is $V = 1.118 \times 10^6 \,\text{V}$.

If the angle between the velocity and magnetic field is 78.5°, the generated voltage is $V = 1.0959 \times 10^6 \,\text{V}$.

Changing latitude will reduce the length of L and increase the magnetic field B, thus for varying degrees and minutes we can show individual coil voltages at relative magnetic field strength:
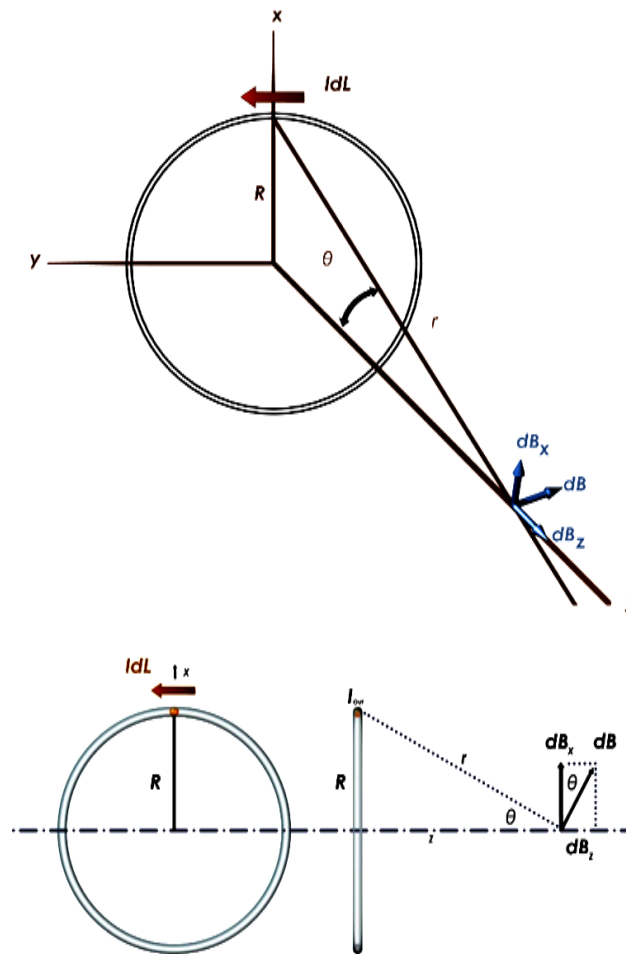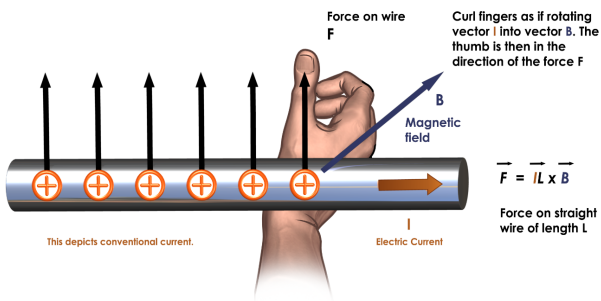

Figure 4. Biot-Savart diagrams.
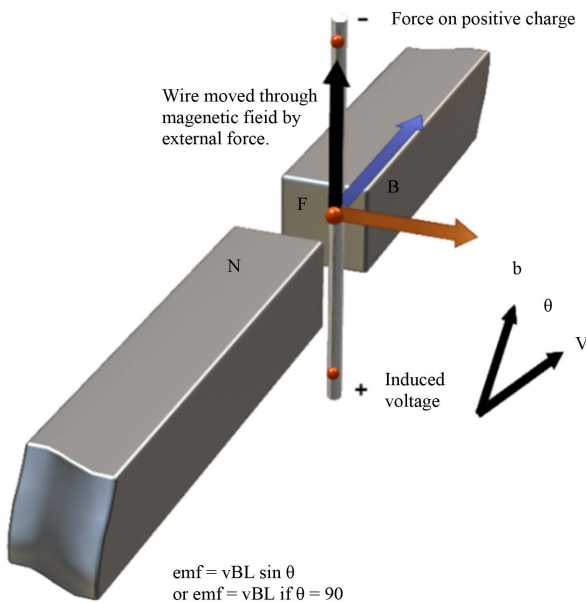
Figure 5. Force on wire.

Figure 6. Rotational force.

$$\text{Equator} = 1095858 \text{ Volts} \ @ \ 0.60 \text{ Gauss}$$

$$\text{Capricorn} = 752875 \text{ Volts} \ @ \ 0.45 \text{ Gauss}$$

$$\text{Cancer} = 752875 \text{ Volts} \ @ \ 0.45 \text{ Gauss}$$

$$\text{Arctic Circle} = 523229 \text{ Volts} \ @ \ 0.65 \text{ Gauss}$$

$$\text{Antarctic Circle} = 523229 \text{ Volts} \ @ \ 0.65 \text{ Gauss}$$

The average value of the five (5) voltages is approximately 730 kv.

7. Calculate Voltage Constant

A voltage constant of K_e can be used to calculate a speed constant K_s of the earth and then compared to Newton's Gravitational Constant.

$$K_e = \frac{\text{Voltage}}{\text{Speed}} (\text{rad/s})$$

$$K_e = \frac{1095858}{7.292 \times 10^{-5}}$$

$$K_e = 1.503 \times 10^{10}$$

$$K_s = \frac{1}{K_v}$$

$$K_s = \frac{1}{1.503 \times 10^{10}}$$

$$K_s = 6.654 \times 10^{-11}$$

We compare to the Torque Constant and Newton's Gravitation Constant and find they again closely match.

$$G = 6.674 \times 10^{-11}$$

Again, percent is less than 1%, which suggest $G = K_s$. Put into words this implies that Newton's Gravitational Constant is derived from a planets motor speed constant, which is inversely related to torque and voltage.

8. Potential Point Charge (Figure 7)

The electric potential energy per unit charge is a characteristic of the electric influence at that point in space. The potential from multiple point charges is the sum of the point charge potentials of the individual charges. Based on 100 V - 150 V/m, the charge of the earth has been calculated to be in the range of 400,000 to 600,000 Coulombs [13].

$$V = \frac{kQ}{r} = \frac{Q}{4\pi\epsilon_0 r}$$

$$\text{Voltage} = \frac{k \times \text{Charge}}{\text{radius}}$$

At a distance $r = 6.38 \times 10^6 \, \text{m}$;
From a charge $Q = 5 \times 10^5 \, \text{C}$;
The voltage is $V = 0.705 \times 10^9 \, \text{V}$.

The earth sphere act as an energy storage device with positive polarity at the north pole and negative polarity at the south pole. A burst of lightning of 704,574,474 Volts is theoretically possible and reports of 1 Billion may not be unreasonable. As a point of comparison Nicolai Tesla calculated the voltage of the sun at 18 Billion Volts [14].

For the sphere, we can calculate Capacitance at surface based on an average value of Q (Coulombs).
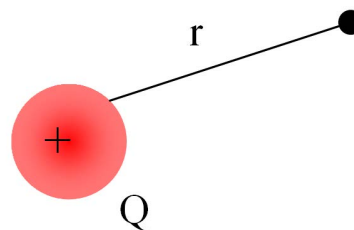

Figure 7. Potential point charge.

$$C = \frac{Q}{V}$$

$$C = \frac{5 \times 10^5 \, \text{C}}{7.04 \times 10^8 \, \text{V}}$$

$$C = 710 \, \text{microfarads}$$

The theoretical Power of the earth is approximately

$$P = V \times I$$

$$P = 7 \times 10^8 \, \text{Volts} \times 1.73 \times 10^9 \, \text{Amps}$$

$$P = 1.211 \times 10^{18} \, \text{Watts}$$

Power of the Earth $= 1.2$ Exawatts

9. Magnetic Field of Toroid (Figure 8)

Finding the magnetic field inside a toroid is function of Ampere's law. The current is the number of loops times the current in each loop. The magnetic field equation is as follow:

$$B2\pi r = \mu NI$$

$$B = \frac{\mu NI}{2\pi r}$$

For a solenoid of radius $r = 6.38 \times 10^6 \, \text{m}$ with $N = 9.8$ turns, the turn density is $n = \frac{N}{2\pi r} = 2.45 \, \text{turns/m}$.

If the current in the solenoid is $i = 1.76 \times 10^8 \, \text{A}$ and the relative permeability of the core is $k = 1$ then the magnetic field at the centre of the solenoid is $B = 0.542$ Gauss. Setting the relative permeability of the core at $k = 1$, the magnetic field near the center of the Toroid is 0.54 Gauss.

10. Magnetic Field Solenoid Calculation (Figure 9)

Winding multiple loops concentrates the magnetic field into what is called a solenoid. The magnetic intensity at the center of the coil is thus given.
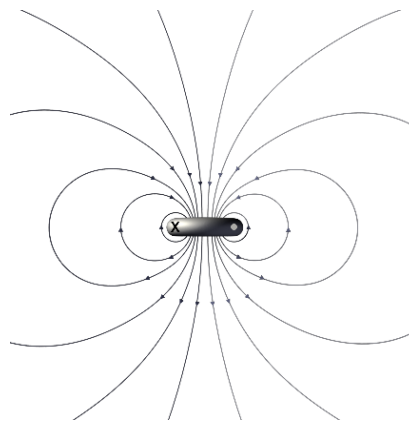

Figure 8. Torroid magnetic field.

$$B = k\mu_0 nI$$

where $\mu = k\mu_0$ and k is the relative permeability of the soil = 1, indicates there is no magnifying effect of the core.

For a solenoid of length $L = 1.276 \times 10^7 \, \text{m}$ with $N = 9.8$ turns the turn density is $n = \dfrac{N}{L} = 7.683 \, \text{turns/m}$. If the current in the solenoid is $i = 1.765 \times 10^8 \, \text{A}$ and the relative permeability of the core is $k = 1$, then the magnetic field at the center of the solenoid is $B = 1.704$ gauss. The magnetic intensity at the center of the earth is approximatly 1.7 Gauss. This compares to measured values of the earths core at 25 Gauss [15].

11. Inductance of Sphere (Figure 10 and Figure 11)

The magnetic field intensity is uniform inside a spherical coil, which is the difference with the field of a long solenoid. A solenoid is not uniform only due to the fringing field.

$$L = \frac{2}{9}\pi N^2 \mu_0 R$$

$$N = 9.8 \text{ Turns}$$

$$R = 6.4 \times 10^6 \, \text{m} \left(\text{earth's radius}\right)$$

$$\mu_0 = 1.3 \times 10^{-6} \, \text{H} \cdot \text{m}^{-1} \text{ or } \text{N} \cdot \text{A}^{-2}$$

For the earth $L = 537 \, \text{Henry}$.

"The exterior lines of magnetic field intensity are those of a dipole, while the interior field is uniform. Thus, the total picture, shown above is one of field lines circulating from south to north inside the sphere and back from north to south on the outside." [16]
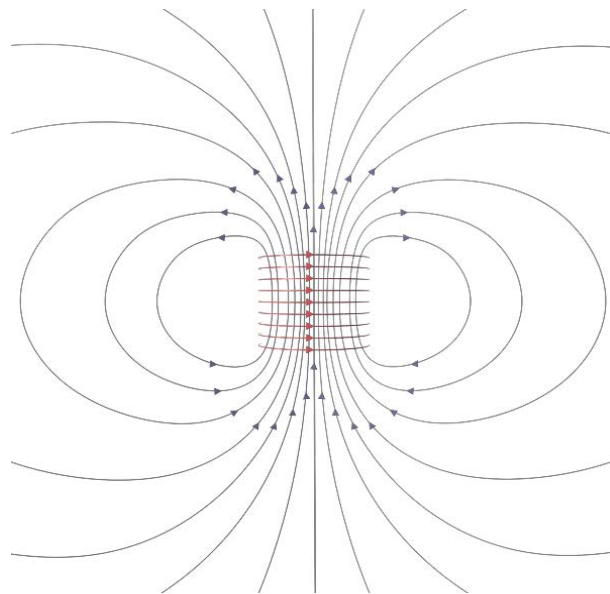

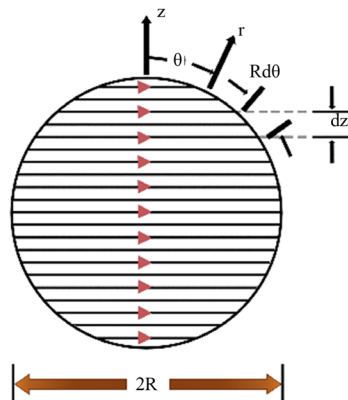**Figure 9.** Solenoid magnetic field.

Figure 10. Sphere coil diagram.

$$L = \frac{\mu N^2 A}{l}$$

l = length of solenoid;

A = cross-sectional area.

Solenoid length 1.28×10^6 cm with N = 9.8 turns.

Coil radius $r = 1.34 \times 10^7$ cm gives area $A = 5.7 \times 10^{10}$ m^2.

Relative permeability of the core k = 1.

Then the inductance of the solenoid is

$$L = 537.06 \text{ Henry}$$

The average area of the earth's spherical coil is approximately 56,764,609,533 m^2.

12. Earth Dipole as Parallel Impedance

The earth is typically referred to in modern geophysics journal or articles as a magnetic dipole with a positive and negative orientation. The author takes no issue with this description of the earth and agrees that the earth is more complex than a simple bar magnet as first described by Gilbert in 1600. In electrical engineering practice, a rotating circuit with a positive and negative orientation can be modeled as a series or parallel circuit depending on the mechanical configuration of the rotating apparatus involved. Both series and parallel models have been considered; and though more difficult to model, the parallel RLC model was chosen for inclusion in this manuscript. A condition of resonance will be experienced in a tank circuit when the reactance's of the capacitor and inductor are equal. On a cosmic scale, it is theorized that the parallel impedance circuit is what maintains the earth, and perhaps other magnetic planets, at constant frequency and speed.

It is noteworthy that much of the earth's mantle is made up of quartz crystal. A quartz crystal works like an RLC circuit, with a narrow band resonant frequency (Figure 12).

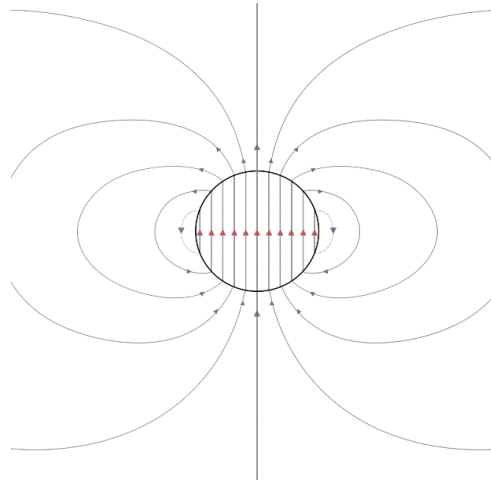The following expression for the resonant frequency is obtained:

Figure 11. Sphere magnetic field.

$$\omega_0 = \frac{1}{\sqrt{LC}} \left[\frac{R_L^2 C - L}{R_c^2 C - L} \right]^{\frac{1}{2}}$$

For a parallel RLC circuit it can be utilized where the frequency at which the impedance is maximum.

$$\omega_0 \approx \frac{1}{\sqrt{LC}}$$

Different possible definitions of the resonant frequency for a parallel resonant circuit (**Figure 13**):

1) The frequency at which $\omega L = \dfrac{1}{\omega C}$ i.e., the resonant frequency of the equivalent series RLC circuit. This is satisfactory if the resistances are small;

2) The frequency at which the parallel impedance is a maximum;

3) The frequency at which the current is in phase with the voltage, unity power factor.

The initial RLC model assumes 465.1 m/s which is equal to the angular rotational value of 7.292 E-5 radians/second. L and C are inserted and solve for R_C and R_L.

For $C = 0.71 \times 10^{-3} \, \text{F}$ and $L = 537$ H at angular frequency $\omega = 7.3 \times 10^{-5} \, \text{rad/s}$, frequency = $1.161 \times 10^{-5} \, \text{Hz}$ and series resistances, $R_C = 4$ ohms and $R_L = 4$ ohms; the impedance is $Z = 4$ ohms at phase $\varphi = -0.597 \times 10^{-3} \, \text{degrees}$.

The resonant condition is:

Using the series resonant frequency, angular frequency $\omega = 0.5 \times 10^2 \, \text{rad/s}$, Frequency $f = 8.2 \, \text{Hz}$; $Z = 96.5 \, \text{ohms}$; $C = 710 \, \text{microfarad}$;

Phase $\varphi = 0$ degrees

$$L = 537 \, \text{Henry}$$

$$Z = 4 \, \text{ohm}$$

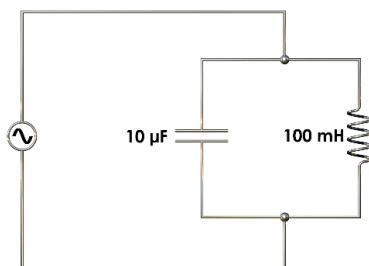$$\text{Angular Frequency} = 7.3 \times 10^{-5} \, \text{rad/s}$$
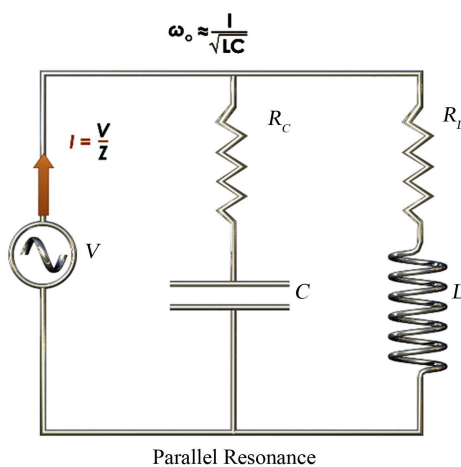
Figure 12. LC circuit diagram.

Parallel Resonance

Figure 13. RLC resonant circuit.

$$f = 1.16 \times 10^{-5} \, \text{Hz}$$

$$\text{Phase Angle} = 11 \, \text{degrees}$$

$$I = \frac{V}{Z}$$

$$I = 7.05 \times 10^{8} \, \text{V} / 4 \, \text{ohms}$$

$$I = 1.76 \times 10^{8} \, \text{Amp}$$

Calculate the Counter or Back Emf of Inductor:

$$V_{emf} = L \frac{\mathrm{d}i}{\mathrm{d}t}$$

$$V_{emf} = 537 \, \text{H} \times \frac{1.76 \times 10^{8} \, \text{A}}{8.6 \times 10^{4} \, \text{s}}$$

$$V_{emf} = 1.095 \times 10^{6}$$

$$K_{e} = \frac{1.95 \times 10^{6}}{7.292 \times 10^{-5}}$$

$$K_{e} = 1.5 \times 10^{10}$$

$$K_s = \frac{1}{1.5 \times 10^{10}}$$

$K_s = 6.66 \times 10^{-11}$ (Newton's Gravitation Constant calculated a third time.)
The watts loss is

$$I^2 R = 1.24 \times 10^{17} \text{ watts}$$

Note that the resonant condition for this RLC configuration is 8.2 Hz. This closely matches the 7.83 Hz Schumann Resonant frequency. Increasing $C = 770$ mF and keeping the inductance fixed will lower the resonant frequency to 7.83 Hz. The difference in capacitance values is likely due to permittivity. C has been calculated based on the permittivity of free space = 8.85E−12. Since the earth is a good conductor the relative permittivity is estimated to be 1.1 which then makes the following a closer electrical analogy of the earth which corresponds to the known Schumann Resonant frequency.

For $C = 0.7693 \times 10^{-3} \text{F}$ and $L = 537$ H at angular frequency $\omega = 7.29 \times 10^{-5} \text{rad/s}$, frequency = $1.16 \times 10^{-5} \text{Hz}$ and series resistances $R_C = 4$ ohms and $R_L = 4$ ohms, the impedance is $Z = 4$ ohms at phase $\varphi = -0.597 \times 10^{-3} \text{degrees}$.

The resonant condition is:

Using the series resonant frequency, angular frequency $\omega = 0.5 \times 10^2 \text{rad/s}$, Frequency $f = 7.8$ Hz; $Z = 89.3$ ohms; phase $\varphi = 0$ degrees.

13. Resonator Frequency

A **helical resonator** is a passive electrical component that can be used as a filter resonator. Characterizing the earth's spherical inductor as a helical resonator the frequency is determined as follows:

$$\text{Wavelength} = \frac{2 \times \text{Length}}{m} \quad \text{where } m = 1, 2, 3 \quad [17]$$

$$f = \frac{c}{\text{wavelength}} = \frac{c \times m}{2 \times L}$$

if $m = 1$,

$$f = \frac{3 \times 10^8 \times 1}{2 \times 1.2756 \times 10^7}$$

$$f = 11.75 \text{ Hz}$$

This is a number for a self supporting Helical Coil in air or vacuum. However, our coil is buried in the earths mantle. The resonator frequency is a close approximation to Schumann Resonance of 7.83 Hz.

The Schumann Resonant frequency ideally, is a function of the radius of the earth and the speed of light.

$$f_n = \frac{c}{2\pi a} \sqrt{n(n+1)} \quad [18]$$

$$f = 10.5 \text{ Hz} \quad @ n = 1$$

We note that our frequency calculation for a Helical Resonator approximates the ideal Schuman Resonant frequency.

14. Electric & Magnetic Fields at Poles

Whenever charged particles are accelerated electromagnetic waves are produced. These waves interact with other charged particles in the form of momentum, angular momentum and energy (Figure 14).

The concentration of magnetic field intensity at the North and South pole results in acceleration of particles into space. The Electric Field has been measured at 100 - 150 V/m at ground level and then dissipates to as low as 0.1 micro volt at 85 km in the atmosphere. Particles are accelerated at ground level and then slow down as the Electric Field weakens and approaches zero in the upper atmosphere. The Magnetic Field meets the Electric Field and begins to equalize forces somewhere between 20 - 30 km. There is a transition or handoff from one field to the other where the particles selected velocity equal the magnetic field divided by the magnetic field.

$$V = \frac{E}{B}$$

The Forces become equal and terminal velocity of the particle is achieved. Particles that are moving too fast or too slow are rejected and filtered away. A circular arc is made around the globe where they reenter at the south poles magnetic field and then accelerate back to earth. Billions of particles circumnavigate the globe at terminal velocity while being bent by the magnetic field. Current scientific theory holds that all particles also have a wave nature, thus electrons have duality of purpose as an electromagnetic wave and as a particle speeding around the globe [19] (Figure 15).

$$r = \frac{mv^2}{qvB} = \frac{mv}{qB}$$ Radius of path produced by magnetic field

If the velocity v is produced by an accelerating voltage V:

$$\frac{1}{2}mv^2 = qV; v = \sqrt{\frac{2qV}{m}}$$
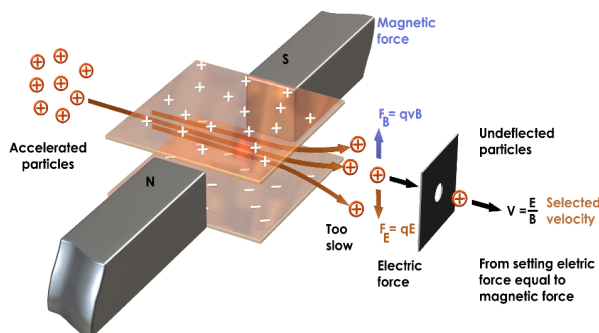
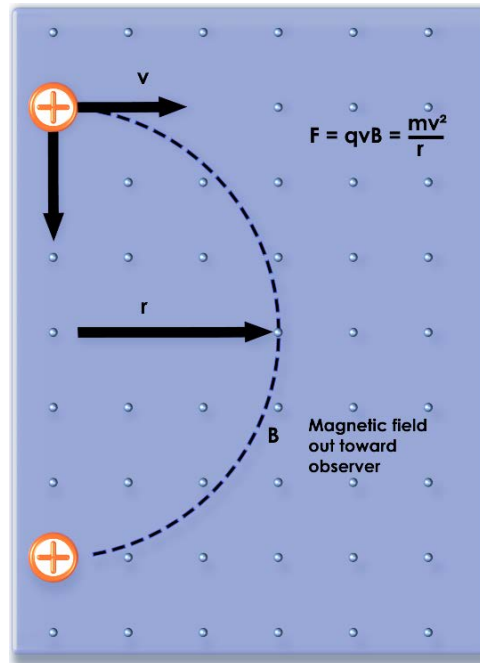Substitution gives:

Figure 14. Velocity selector diagram.

Figure 15. Particles in magnetic field.

$$r = \frac{1}{B}\sqrt{\frac{2mV}{q}}$$

What is of interest is how the earth's natural velocity selector functions in the region of 20 km to 30 km and the average terminal velocity of particles as they turn and make their way through the strong magnetic field at the poles. The Magnetic Field weakens near the equator and then transitions as the charged particles makes it way to the South Pole.

15. Centripetal Acceleration (Figure 16)

Acceleration of an object moving in uniform circular motion, caused by a net external force, is called centripetal acceleration. Centripetal is defined as "center seeking" or "towards center".

It has long been asserted that acceleration and gravity are one in the same. We propose a theory of gravity based on the terminal velocity of particles generated from the earth entering the atmospheres magnetic field at 22 km above the earth at 7920 m/s. This is the ideal selector velocity to achieve an acceleration of 9.8 m/s^2 towards the center of the earth. The radius of the earth at 22 km is equal to 6,400,000 meters which generates the following centripetal calculations for speed and acceleration:

For a velocity of 7920 m/s and radius 6.4×10^6 m, the centripetal acceleration is 9.801 m/s^2.

"The magnitude of [the natural electric] field decreases with altitude; at 10 km, it has a value of about 3% of that at the surface, whereas at 30 km it is about 300 mV/m and 1 μV/m at about 85 km (Raked and Uman, 2003)." [20]
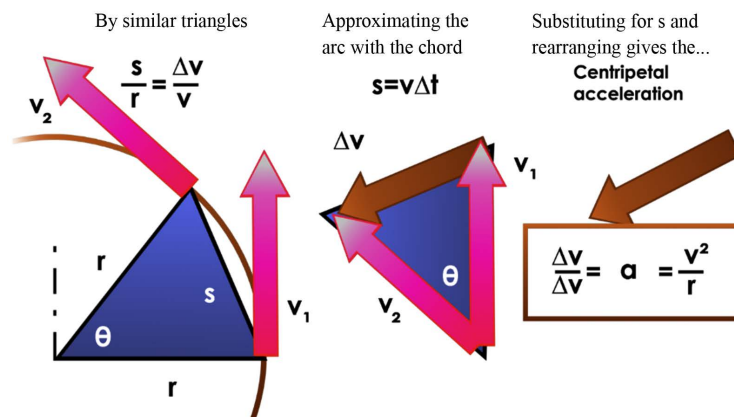
Figure 16. Centripetal acceleration.

Implementing the equation $v = \dfrac{E}{B}$ for various elevations:

10 km $v = \dfrac{150\,\text{V/m} \times 0.03}{5 \times 10^{-5}} = 90000\,\text{m/s}$

22 km $v = \dfrac{150\,\text{V/m} \times 0.00264}{5 \times 10^{-5}} = 7920\,\text{m/s}$

30 km $v = \dfrac{150\,\text{V/m} \times 0.002}{5 \times 10^{-5}} = 6000\,\text{m/s}$

85 km $v = \dfrac{150\,\text{V/m} \times 1 \times 10^{-7}}{5 \times 10^{-5}} = 3\,\text{m/s}$

At 22 km, the hand off occurs whereby the Electric Field is equal to approximately 400 mV and the Magnetic Field is equal to an average of .00005 Tesla. The Electric Field continues to weaken rapidly and has no further effect on the speed of the particle. The particle begins its circular pattern around the globe due to the force of the Magnetic Field located above the Electric Field. Since the particle is travelling in a circle around the globe at 7920 m/s the acceleration pointing towards the center or towards earth is 9.8 m/s or gravity.

The equation for gravity equates Faraday's electro-magnetism with Newtonian physics. Electrical Acceleration and Kinetic Acceleration meet high in the atmosphere.

$$a = \frac{v^2}{r}$$

$$v = \frac{E}{B}$$

$$a = \frac{\left(E/B\right)^2}{r}$$

16. Centripetal Governor

The purpose of the earth's electromagnetic RLC resonant circuit is to set the resonant frequency of the planet, and the purpose of the atmospheric electromagnetic field is to maintain the speed of the planet through acceleration and dece-

leration. These two electrical systems work together to keep earth running as a constant speed planet. The resonant frequency of the earth is determined by the tuned circuit of the earth's parallel inductor and capacitor. Centripetal acceleration or gravity is needed to accelerate or decelerate the earth to maintain the tuned speed of 465.1 m/s. Gravity does this by increasing or decreasing its inward acceleration thereby acting on the mass of the earth. By the equation $F = m \times a$, we know that mass is constant so a change in acceleration will increase or decrease the force acting towards the center of the earth. Gravity is a centripetal governor that acts as a dynamic braking system on the earth. The brake lets off to speed up and pushes down on the earth to speed up. Fortunately for the inhabitants of the earth the RLC circuit is well designed and the force inward or outward is not perceptible. Gravity or centripetal acceleration does not have large swings so the tuned circuit is very stable and the servo control mechanism is tightly controlled.

The acceleration rate of the earth is controlled by terminal velocity or E/B.

The steady state force of the governor can be calculated using Lorentz equation:

$$F = QE + QvB$$

$$F = \left(500000\,\text{C} \times 0.00264\,\text{V/m}\right) + \left(500000\,\text{C} \times 465.1\,\text{m/s} \times 0.00005\,\text{T}\right)$$

$$F = 1320\,\text{N} + 11627\,\text{N}$$

$$F = 12974\,\text{N}$$

The atmospheric electromagnetic field is connected to the earth via commutation or lightning, thus it is a closed-loop control system. A simple closed-loop control system moves to correct its output is described by its frequency and damping ratio. Monitoring of the Schumann frequency spectrum may show signature of acceleration or deceleration. Since the earth is a constant speed machine it operates at a fixed angular frequency. This speed is governor controlled by mechanical acceleration or deceleration which is proportional to the earth's magnetic field.

Mechanical Acceleration = Electrical Acceleration

$$a = \frac{(E/B)^2}{r}$$

17. Turns Ratio Calculation

$$V = L\frac{\mathrm{d}i}{\mathrm{d}t}$$

$$V = \frac{2\pi N_2 \mu_0 R I}{9t}$$

$$N_2 I = \frac{9Vt}{2\pi \mu_0 R}$$

$$N_2 \times 1.73 \times 10^9\,\text{A} = \frac{1.1 \times 10^6 \times 8.64 \times 10^4\,\text{s}}{2\pi \mu_0 R}$$

$$N_2 \times 1.73 \times 10^9 \, \text{A} = \frac{8.5 \times 10^{11}}{50.34}$$

$$N_2 \times 1.73 \times 10^9 \, \text{A} = 1.69 \times 10^{10}$$

$$N_2 = \frac{1.69 \times 10^{10}}{1.73 \times 10^9}$$

$$N_2 = 9.78$$

18. Calculate Forces between Earth and Moon

Comparison of electrostatic force and kinetic force of attraction between planets.

$$F = \frac{K_e Q_1 Q_2}{R^2}$$

And

$$F = \frac{G M_1 M_2}{R^2}$$

$$F = \frac{K_e Q_1 Q_2}{R^2}$$

$$Q = 4\pi \varepsilon_O r^2 E$$

$$K_e = 8.99 \times 10^9 \, \text{N} \cdot \text{m}^2 \cdot \text{C}^{-2}$$

$$\varepsilon_O = 8.85 \times 10^{-12} \, \text{m}^{-3} \cdot \text{kg}^{-1} \cdot \text{s}^4 \cdot \text{A}^2$$

$$4\pi \varepsilon_O = 1.113 \times 10^{-10} \, \text{F/m} \, (\text{earth})$$

$$4\pi \varepsilon_O = 1.113 \times 10^{-10} \, \text{F/m} \, (\text{moon})$$

$$4\pi \varepsilon_O = 1.113 \times 10^{-10} \, \text{F/m} \, (\text{earth})$$

$$R = 3.844 \times 10^8 \, \text{m} \, (\text{distance from earth to moon})$$

$$r = 6.378 \times 10^6 \, (\text{earth})$$

$$r = 1.737 \times 10^6 \, (\text{moon})$$

$$\text{Mass} = 5.974 \times 10^{24} \, \text{kg} \, (\text{earth})$$

$$\text{Mass} = 7.349 \times 10^{22} \, \text{kg} \, (\text{moon})$$

$$E = 100 \, \text{V/m} \, (\text{earth})$$

$$E = 1 \, \text{V/m} \, (\text{moon-estimate})$$

$$Q = 1.1127 \times 10^{-10} \, \text{F/m} \left(6.378 \times 10^6 \, \text{m}\right)^2 \times 100 \, \text{V/m} = 453613 \, \text{Coulomb} \, (\text{earth})$$

$$Q = 1.1127 \times 10^{-10} \, \text{F/m} \left(1.737 \times 10^6 \, \text{m}\right)^2 \times 1 \, \text{V/m} = 335 \, \text{Coulomb} \, (\text{moon})$$

$$F = \frac{8.99 \times 10^9 \, \text{N} \cdot \text{m}^2 \cdot \text{C}^{-2} \times 453613 \, \text{C} \times 335 \, \text{C}}{\left(3.844 \times 10^8\right)^2}$$

$$F = 8.6 \, \text{N}$$

$$F = \frac{GM_1 M_2}{R^2}$$

$$F = \frac{\left(6.674 \times 10^{-11}\,\text{N} \cdot \text{m}^2/\text{kg}^2\right)\left(5.974 \times 10^{24}\,\text{kg}\right)\left(7.349 \times 10^{22}\,\text{kg}\right)}{\left(3.844 \times 10^8\,\text{m}\right)^2}$$

$$F = \frac{2.930 \times 10^{37}\,\text{N} \cdot \text{m}^2}{1.478 \times 10^{17}\,\text{m}^2}$$

$$F = 1.982 \times 10^{20}\,\text{N}$$

The electrostatic force is far less than the kinetic force of attraction. Clearly there is a missing magnetic force of attraction. "From such a long distance both planets are small enough to be represented as single points then they can be represented as point magnetic charges. Classically, the force between two magnetic poles is given by:" [21]

$$F = \frac{\mu q_{m_1} q_{m_2}}{4\pi r^2}$$

where:

F is force (SI unit: newton);

q_{m_1} and q_{m_2} are the magnitudes of magnetic poles (SI unit: ampere-meter);

μ is the permeability of the intervening medium (SI unit: tesla meter per ampere, henry per meter or newton per ampere squared);

r is the separation (SI unit: meter).

"The magnetic force produced by a bar magnet, at a given point in space, therefore depends on two factors: the strength p of its poles (**magnetic pole strength**), and the vector l separating them. The moment is related to the fictitious poles as:"

$$q_{m_1} = \frac{\text{Magnetic moment}}{\text{Length}} \quad [22]$$

$$q_{m_1} = \frac{8 \times 10^{22}\,\text{A} \cdot \text{m}^2}{1.76 \times 10^6\,\text{m}} \quad [23]$$

$$q_{m_1} = 6.27 \times 10^{15}\,\text{A} \cdot \text{m}$$

A similar equation for the force between two wires carrying current I_1 and I_2 is as follows:

$$F = \frac{\mu_0 I_1 \times I_2}{2\pi r}$$

It is readily discernible that the force of attraction due to the Lorentz force, the force between point charges, magnetizing force and force between wires is insufficient force to achieve that of Newton's Law of gravity using the mass of two planets.

19. New Equation for Planetary Attraction

The magnetic force of attraction of planets is most like two magnetic solenoid

that are pulling towards each other. The magnetic force is like Lenz law for solenoids but instead of attraction to a piece of metal we have two spherical magnetic solenoids attracted to each other. The magnetic force is much larger in orders of magnitude then the electrostatic force, magnetizing force or the force between wires. Those forces are additive to the force of the spherical coils, and should be considered, but for the point of discussion are nearly inconsequential. What is proposed is a new theoretical equation for magnetic planets that more nearly matches Newton's Law.

Newton's Law = Electromagnetic Law.

Force of attraction mass = Force of attraction solenoid

$$F = \frac{Gm_1 m_2}{r^2} = \frac{kFm_1 Fm_2}{4r^2}$$

$$F = \frac{Gm_1 m_2}{r^2} = \frac{k(n*i)^2 \mu_o A(n*i)^2 \mu_o A}{4r^2}$$

Solving for k:

$$Gm_1 = \frac{k(n*i)^2 \mu_0 A}{4} \ (\text{earth})$$

$$k = \frac{4Gm_1}{(n*i)^2 \mu_0 A}$$

$$k = \frac{4(6.674 \times 10^{-11})(5.974 \times 10^{24})}{(1.73 \times 10^9)^2 (1.2566 \times 10^{-6})(5.676 \times 10^{10})}$$

$$k = 7.4 \times 10^{-9}$$

20. Geo-Dynamo and Richardson Effect

The **Richardson Effect** (after Nobel Laureate and Princeton Professor Owen Richardson), is a physical phenomenon involving rotation that is characteristic of solenoids. Albert Einstein and Wander Johannes de Haas confirmed experiments shortly after Richardson paper, in the mid-1910s demonstrating magnetism, angular momentum, and spin of elementary particles. "The effect corresponds to the mechanical rotation that is induced in a ferromagnetic material (of cylindrical shape and originally at rest), suspended with the aid of a thin string inside a coil, on driving an impulse of electric current through the coil." [24]

The figure on the right is the electrical diagram of the experiment carried out by Einstein and Johannes de Haas. The author contends that this electrical diagram, when applied in a space vacuum would result in a rotating helical coil with a counter rotating armature. Thus, the electrical diagram will perform as an approximate analogy to the mechanical figure on the left which represents the time scale motion of the Earth pole of rotation [25]. The rotation of the earth is therefore thought to be a derivative of motor torque and acts as a rotating electrical machine in nature (**Figure 17**).
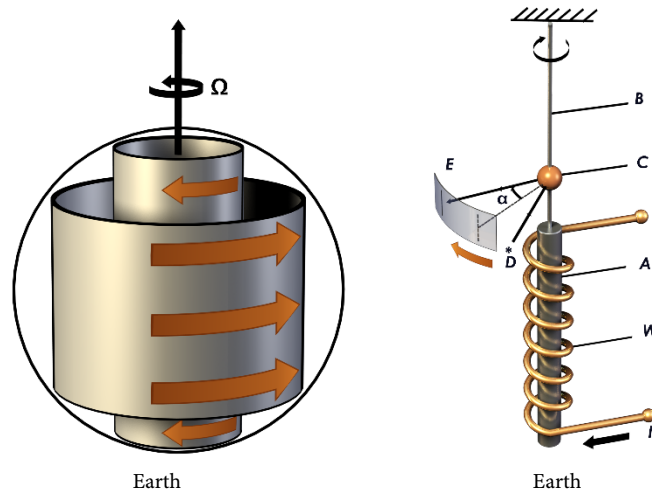
Figure 17. Mechanical and electrical analogy of earth.

21. Solar Power System

The sun and earth are electromagnetically connected just like a single-phase transformer with no iron. The flux transfer between the sun and planets occurs in the vacuum of space. Imagine the coil on the left being the sun and the coil on the right being the earth. The sun coil is many times larger than the earth's coil, and there are numerous planets that are also similarly connected. The sun acts as a multi tap single phase transformer with several tertiary winding or planets. Planets by being in a vacuum, and the Richardson Effect for coils, the planets all rotate. Orbits and positioning are a function of attraction to other like magnetic bodies. Thus, the sun is the power generator and the planets are motors all working much like a power system here on earth. The sun has a surface area that is 12,000 times that of earth, and a magnetic field that is approximately double. In simple terms, the magnetic field of the sun is up to 24,000 times that of earth. It is postulated that the electromagnetic field of the sun is so great and so powerful that magnetic flux transfer occurs thru space and provides energy to motor the earth. A picture of the Solar System scaled to size and distance, gives a proportional perspective on the impact the Suns enormous electromagnetic field will have on the miniscule planet earth magnetic field (Figure 18).

It is postulated that flux transfer between the sun and the earth is how the earth created and maintains its magnetic field. The magnetic field of the earth creates a magnetic force which attracts and repels the sun. It is the balancing of magnetic fields between planetary bodies, like standing magnets on a bench that determines the distance between the planets, and their respective orbits.

Below are simple dipole magnets that represent the sun and the earth. Or, the earth and a nearby planet. There is an attraction of North to South from one magnetic dipole to the other. But, there is also a repulsion of South to South and North to North. Magnets or planets with such alignment have four vector forces continually existing that stabilize the physical distance and positions of the
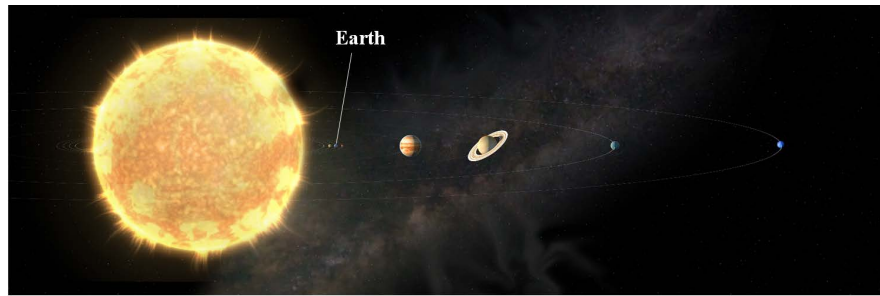
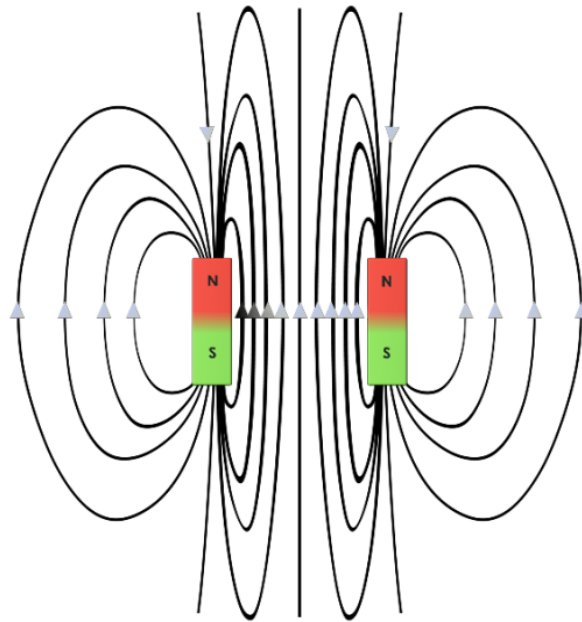**Figure 18.** Solar power system.

Figure 19. Magnetic attraction and repulsion.

planets relative to each other. As shown the magnetic fields of planets press against each other, as described by Nickola Tesla. Fields that are aligned concentrate as shown. Since the horizontal distance of repulsion is shorter than the diagonal distance of attraction, there is always a slight repulsion of the planets. We thus always have a gap between planets and a slight pushing away from each other, which may help to explain our expanding universe (**Figure 19**).

In 2008, David Sibek of the Goddard Space Flight Center first reported Flux Transfer Events between the Sun and the Earth were occurring every 8 minutes. A magnetic portal will open in the earth, linking the earth to the sun 93 million miles away. Tons of high energy particles are thought to enter through the opening [26]. This connection or "magnetic rope" has been observed at Mars, Saturn, and all the way to Jupiter. Flux transfer events at Saturn are like that of earth, but Mercury is reported to have flux transfer events at ten times the rate of earth. Earth's magnetosphere and the Sun's magnetic field are touching each other continuously on the day side of Earth. Approximately every eight minutes, these fields briefly merge, forming a temporary "portal" between the Earth and

the Sun through which high-energy particles or "magnetic flux" can flow. The portal takes the shape of a helical cylinder up to 4 times the width of Earth. [27] The figures below demonstrate how the Sun and Earth work similarly to how flux transfer occurs in a large power transformer. It is conceivable that the Flux Transfer Events occur at pulse widths that may correlate with the frequency of the earth rotation which is known to be 1.16×10^{-5} Hz. Additional research into the period, magnitude and duration are needed to verify this hypothesis (**Figure 20**).

Based on the recent discovery of Flux Transfer Events it is conceivable that the Suns is the driving electromagnetic force behind planetary speed of rotation. Below is a table showing the magnetic fields and rotational speed of the planets in the solar system [28].

	Rotation period (days)	Magnetic moment (earth = 1)	Field at equator (gauss)	Field ratio maximum/ minimum	Tilt of dipole (degrees)
Mercury	59	0.0007	0.003	2	+14°
Venus	243	<0.0004	<0.0003	?	−
Earth	1.00	1	0.305	2.8	+10.8°
Mars	1.03	$<2.5 \times 10^{-5}$	$<5 \times 10^{-5}$	?	−
Jupiter	0.41	20,000	4.2	4.5	−9.6°
Saturn	0.44	600	0.20	4.6	−<1°
Uranus	0.72	50	0.23	12	−59°
Neptune	0.74	25	0.14	9	−47°

Carl Frederick Gauss was correct when he reported that the earth's magnetic field was derived from the center of the earth. Such would also be the case if he were standing next to the secondary of a single-phase transformer. But, what he and others may not have realized was that the flux transfer from the Sun to the Earth is the source energy for the magnetic field that is surrounding the earth. Calculations of a simple loop have shown that 1.7 Billion Amps are needed continuously to maintain a magnetic field of 0.25 to 0.60 surrounding the globe. It takes enormous amounts of continuous energy to rotate the earth, provide heat for the atmosphere and sustain the lifesaving electromagnetic field. The author maintains that although Gauss was correct in his views of the earth's magnetic field, he also believes that recent information suggests the Flux Transfer Events from the Sun are what helps power and synchronize the earth in its geo orbit. It is plausible that a nuclear core may be the primary source of energy that self-propels the earth, based on calculations of 1.7 billion amps and nearly a billion volts. Such electrical power would create sufficient heat to create a fusion core. But, this is suggestive of a standalone perpetual motion machine fueled by an independent yet stable power source. From a power system stand point it is not plausible that an electrical machine, that is infinitesimally small compared to neighboring machines, would generate and/or motor itself at near perfect speed
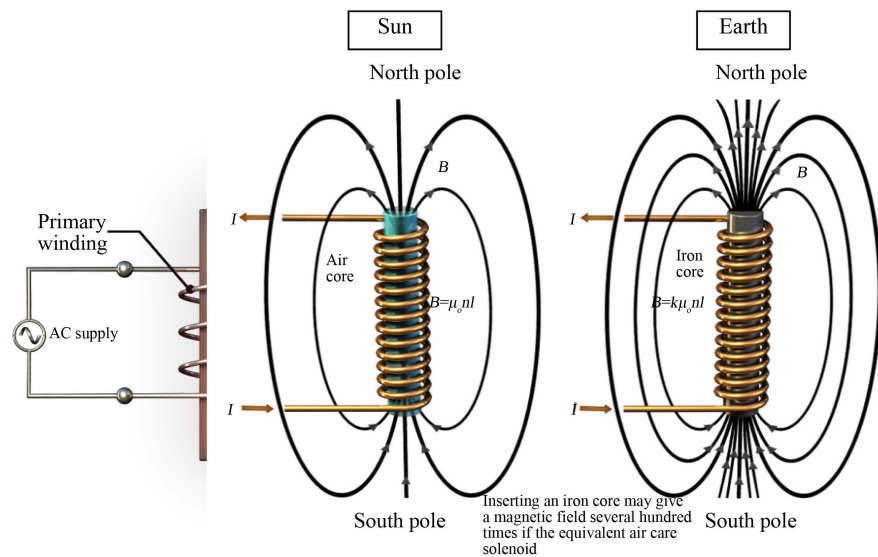
Figure 20. Transformer action of sun and earth.

and frequency for billions of years with no electrical connection to nearby electrical machines. Modern astrophysics should consider the electromagnetic coupling of the sun to the planets as a catalyst of electromagnetic energy which initiates and sustains thermal nuclear reaction of the core. The solar power system view, as it relates to electrical engineering, is required to achieve energy balance, regulate planetary speed and sustain geodesic synchronism of the planets.

22. Conclusions

The earth has an inductive coil wrapped around its periphery of 9.8 turns. The rotation of the coil and the earth are attributed to the Richardson Effect. The Einstein-de Haas test results confirm the Richardson Effect and provide explanation for earth rotation and help to understand how the inner iron core spins in the opposite direction of the outer core, mantle and surface. Due to the tilt of the earth, the rotating coils nearest the equator will cross from the positive electromagnetic field of the north pole to the negative field of the south pole. The direction of current flow in the wires will reverse and commutation occurs. This commutation of the earth shows up in the form of lightning from ground to the opposite poles electric field. The normal running current of the earth is very small, but the fault current of lightning is large. There are over 1.4 billion lighting strikes of various ampacity every year. The rotating strikes are believed to be what charges the atmospheric electromagnetic field and gives the north and south poles their polarity. The Schumann Resonance of 7.83 Hz is known to be related to lightning. The North and South Pole act as fixed magnetic fields. Lightning occurs near the equator and up into the regions of Tropics of Cancer and Capricorn. Above these latitudes the coils are too short in length and at such an angle that they cannot cross to opposite poles and as such commutation or

lightning does not occur. The earth's parallel RLC circuit operates as a resonant circuit to precisely control resonant frequency which then acts as a governor to control the rotational speed of the earth.

The magnetic coil that extends from the south pole to the north pole is shaped somewhat like a helical resonator. Its cavity acts as a particle accelerator and wave guide that generates the earth electromagnetic field at Schumann Resonant frequency, which is also correlated to the frequency of the earth's commutation circuit or lightning. The electric field in the near atmosphere decelerates the particles thru natures velocity selector and then transitions to the magnetic field when $v = E/B$. The earth's electromagnetic field at the poles acts as filter for particles with a velocity of 7920 m/s. The magnetic field bends the particles around the earth. Experimentation is suggested with mass spectrometry to assess select and terminal velocity of particles at known atmospheric electric field values. Studying the relationship of particles and electromagnetic waves may be fruitful in further unlocking the secrets of gravity. The workings of the earth's governor control to maintain constant speed has been described. Research into the earth's servomechanism and relationship to Shuman Resonance would be of interest.

A new equation has been developed for electromagnetic planetary attraction that is equated to Newton's Law. It is conceivable under Ampere's hypothesis that all bodies are magnetic to some minute degree due to the circulating motion of electrons in the atom. The new equation, just like Newton's law, would apply to all atomic matter. Thus, determining the inductance and current of an apple may be the explanation, and the answer to Newton's questions, as to the unseen force pushing the apple to earth. We now know the turns ratio of the earth is 9.8. Flux Transfer Events are a contributing energy source to the Earth electromagnetic field. Energy is being transferred from the Sun to the earth every 8 minutes via Flux Transfer in a way that is like the operation of a power transformer. It is believed that the Sun acts as a fusion powered electrical generator that transmits energy to the planets which in turn act as rotating electrical machines. The sun powers the earth and all other planets using electromagnetic energy and power transmission thru flux transfer. We know that velocity of a motor is proportional to the frequency of the supply system. More detailed information regarding the timing and pulses duration of Flux Transfer Events may equate to the frequency or velocity of the earth.

Acknowledgements

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