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Law of Universal Magnetism, $F = k_e \times H$

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Abstract

A new universal equation using planet magnetic pole strength is presented and given reasoning for its assemblage. Coulomb's Constant, normally used in calculating electrostatic force is utilized in a new magnetic dipole equation for the first time, along with specific orbital energy. Results were generated for five planets that give insight into specific orbital energy as an energy constant for differing planets based on gravitational potential at the surface of a planet. Specific energy can be evaluated as both energy per unit volume (J/kg) and/or specific orbital energy (m^2/s^2). Due to a multitude of terms that lead to confusion it is recommended that the IEEE standards committee review specific orbital energy SI units for m^2/s^2. The magic number for cyclonic "lift off", or anti-gravity, is calculated to be $\epsilon = 148\ m^2/s^2$ the value at which a classical law of magnetism appears as $F = k_e \times H$.

Keywords

Coulomb's Constant, Magnetic Moment, Magnetic Pole Strength, Specific Orbital Energy, Storm Relative Helicity

1. Introduction

Hooke's Law, $F = kx$ was named after Robert Hooke, a 17th century British physicist. Hooke first became aware of the law in 1660 and stated the law for the first time in 1676 in Latin Anagram. Following up in 1678, Hooke published the solution of his anagram UT TENSIO, SIC VIS ("AS THE EXTENSION, SO THE FORCE" [1]. In 1687, Isaac Newton introduced the laws of motion and laws of gravitation. The laws of motion are defined in Principia, forming the foundation of classical mechanics: Newton's law of universal gravitation and a derivative of Kepler's law of planetary motion. The Principia is considered one of the great achievements in scientific history [2]. Gauss's law of gravity and Kepler's first, second and third laws of orbital motion, first introduced in 1609, are the four accomplishments considered as classical laws of physics. Nearly four centuries have transpired since these great men walked the Earth and published their manuscripts. No greater gift could be bestowed to honor our heroes of science than to proclaim a new universal law of electromagnetism.

2. Introduction

Planetary force is theorized to be equal to the difference of magnetic repulsion and magnetic attraction of the heavenly bodies [3]. The parallel configuration of the magnets is such that attraction is greater than repulsion, which corresponds to tension and compression. Using satellite data collected on magnetic moments, we can make ball park estimates of a planet's magnetic pole strength [4]. A new equation is proposed that is analogous to Newton's Universal Law of Gravity. By way of mathematical example, we endeavor to use electromagnetism to understand the agent acting behind the force of gravity.

Newton's Law of Gravity

$$F = \frac{Gm_1m_2}{r_2}$$

Law of Universal Magnetism

$$F = \frac{k_e H_1 H_2}{r^2 \epsilon}$$

where,

F = Force (N)

k_e = Coulomb Constant N $m^2/A^2 \cdot s^2$

H_1 = Magnetic Pole Strength (Am) = μn_1 Magnetic Moment (Am^2)/Length (m)

H_2 = Magnetic Pole Strength (Am) = μn_2 Magnetic Moment (Am^2)/Length (m)

r^2 = distance between H_1 and H_2 squared (m^2)

ϵ = Specific Orbital Energy (m^2/s^2)

Coulomb's constant is a scaling factor that appears in Coulomb's electrostatic law as well as in other electric-related formulas [5]. The large numerical values present in Newton's gravitational calculations first led me to considering Coulomb's constant in our newly invented magnetic formula. Coulomb's constant is one of the few electrical constants that give the large proportions, which are needed to equate with Newton's results. The units that result from inclusion of the constant create an equation unbalance that were then offset by incorporating specific orbital energy. The equation meets the fundamental requirement for unit reduction. The equation also meets the three general requirements of Coulomb's law. The planets are separate and do not overlap. There is movement, but as noted Einstein's theory of relativity is given consideration, and as a result an extra factor, specific orbital energy is introduced. This alters the force produced on the planets. The planetary magnetic equation meets the rules of using Coulomb's constant. The permeability constant, known as the magnetic constant is a measure of the amount of resistance in free space [6].

In the gravitational two-body problem, the specific orbital energy of two orbiting bodies is the constant sum of their mutual potential energies and their total kinetic energy, divided by the reduced mass. For an elliptical orbit the specific orbital energy is the additional energy required to accelerate a mass of one kilogram to escape velocity. In this case the specific orbital energy is also referred to as characteristic energy. In mathematics, characteristics is defined by the whole number or integral part of a logarithm, which gives the order of magnitude of the original number. The term has an ancient derivation as the third integration constant when integrating the equation of motion.

For an elliptic orbit the rate of change of the specific orbital energy with respect to a change in the semi-major axis is

$$\epsilon = \frac{\mu}{2a^2}$$

where

$\mu = Gm_1 + Gm_2$ is the standard gravitational parameter; a is the semi-major axis of the orbit.

In the case of circular orbits, this rate is one half of the gravity at the orbit [7]. This corresponds to the fact that for such orbits the total energy is one half of the potential energy, because the kinetic energy is minus one half of the potential energy. All the planets have an elliptical orbit, however to keep the presentation simplified, and have a verifiable citation, we will be assuming a circular orbit for the planets in our calculation.

3. Calculate Specific Orbital Energy

To calculate ϵ, I will be creating a gravitational potential energy value based on the potential energy of surface acceleration at a height of 1 meter for each planet. This represents the centering, yet repelling force for planets which is inversely proportional to the attractive magnetic force and is what opposes the magnetic attraction. The equation thus attracts and repels, which accounts for steady state orbits. ϵ represents the orbital energy of the two body planets being computed. Two planets have a counter centering acceleration g, which represent a single *"relative"* gravitational potential energy. Intuitively it makes sense that an object standing on one planet would feel the centering pull from both planets, with the nearest planet, being more prominent. The acceleration g, for each planet, is derived from the escape velocity of the dual-purpose electron, which acts as a particle and electromagnetic wave. With a circular orbit, escape velocity is $\sqrt{2}$ times the orbital speed. Referring to **Figure 1**, dividing Earth's escape velocity of 11.186 km/s by $\sqrt{2}$ equals 7910 m/s. This is the same value that I calculated for the velocity of orbiting electron/particles in my previous paper which we know equals circular velocity that creates a centripetal acceleration of 9.8 m/s^2, or *g*, for Earth [3]. The electrons create local gravity *g* for our planet by establishing close orbit, and other electrons leave the planet at an escape velocity equal to or greater than 11.2 km/s. The traveling waves then enter another planet's orbit at or near its escape or entry velocity, where it then slows by $\sqrt{2}$ and comes under the influence of that planet's gravity. A gravitational potential energy is also thus established at various heights or distances from the surface of the various planets.

In Table 1, we calculate the "relative" values of mass and radius of planets in our solar system. Using the same calculation as above for Mercury relative to Earth, we obtain the following:

If $M = 0.0558 M_{\text{Earth}}$

And $r = 0.383 r_{\text{Earth}}$

Then $V_{\text{escape}} = 4267$ m/s

This data corresponds to an escape gravity of

$$g = 3.72\ \text{m/s}^2$$

The expression for gravitational potential energy is derived from the calculation of escape velocity and typically used in determining satellite payload energy to escape from one planet's orbit to another. However, for objects near a planet the acceleration of gravity, g, can be considered to be nearly constant and the expression for potential energy relative to the planet's surface becomes

$$G_{PE} = g \times h \quad [8]$$

With the assumption that the magnetic path of electrons travels a circular orbit and specific orbital energy equals one half of gravity at the surface of the planet, I conclude that the specific orbital energy is the velocity of the electron at the surface of the planet, which equates to very nearly the gravitational potential energy of the planet at or near the surface (Table 2).

To help readers understand Specific Orbital Energy, we invite one to imagine standing midway between Earth and Mercury. If one were to look at either planet with a microscopic lens one would see a blanket of electrons swirling around each planet. If electrons were visible it would look like a spherical

Table 1. Mass and radii of bodies in the solar system in relation to Earth.

	Mass*	Radius*
Mercury	0.0558	0.383
Venus	0.815	0.95
Earth	1	1
Mars	0.107	0.532
Jupiter	318	11.2
Saturn	95.1	9.41
Uranus	14.5	4.06
Neptune	17.2	3.88
Pluto	0.01	0.2
Moon	0.0123	0.273

*relative to Earth mass= 5.976×10^{24} kg; Earth equatorial radius = 6378 km; $G = 6.67 \times 10^{-11}$ Nm^2/kg^2.

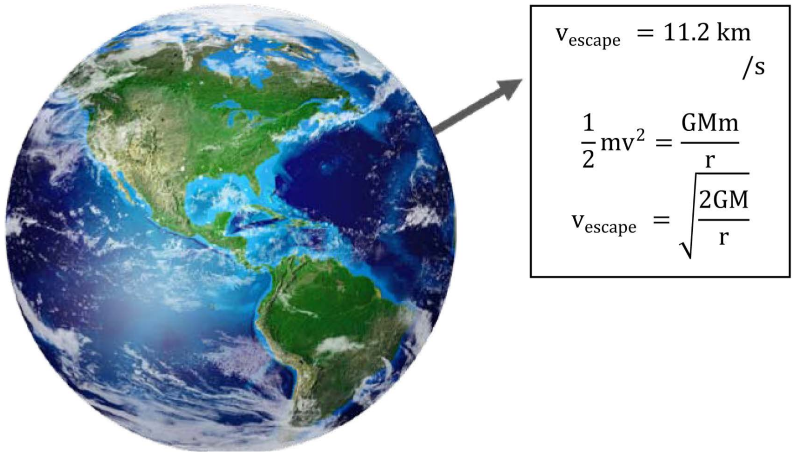

Figure 1. Calculation of escape velocity from Earth.

Table 2. Gravity, escape velocity, orbital velocity and ϵ of different planets.

	Gravity (g)	Escape V_{esc} m/s	Orbital V_o m/s	ϵ (m^2/s^2)
Earth	9.8	11,200	7920	4.9
Mercury	3.7	4250	3000	1.85
Jupiter	24.8	60,200	42,500	12.4
Saturn	10.5	36,000	25,519	5.25
Uranus	8.6	21,400	15,100	4.3
Neptune	11.2	23,500	16,600	5.6

tornado literally engulfing each planet. Each planet would have billions of electrons speeding along at 7900 m/s around Earth and 3000 m/s around Mercury. This results in a centripetal acceleration for each planet that centres the planet and gives each planet its gravity. We know Earth has a gravity of 9.8 m/s^2 and Mercury is calculated to be 3.7 m/s^2. Given that you are standing between these two accelerations and have mass there would be two forces pulling you apart. The planets are thus repelling each other, though it would be quite weak at 38.5 million meters, which is midway. However, if you were to move to one side or the other the force would be greater. We know from the table below (Table 3) that the concentration of electrons traveling at orbital speed is closest to the surface of the planet, thus gravity is strongest nearest the surface. We therefore choose a 1-meter height to calculate a "relative" to Earth gravitational potential energy. We are calling this the specific orbital speed in our equation.

4. Calculate Magnetic Force between Earth and Mercury

Here, I calculate the force between Earth and Mercury whereby,

Coulomb's Constant

$$k_e = 9\times 10^9\ \mathrm{N\cdot m^2/A^2\cdot s^2}$$

Magnetic Pole Strength of Earth

Table 3. Orbital parameters of various types of orbits.

Orbit	Center-to-center distance	Altitude above the Earth's surface	Speed	Orbital period	Specific orbital energy
Standing on Earth's surface at the equator (for comparison—not an orbit)	6378 km	0 km	456.1 m/s (1674 km/h or 1040 mph)	23 h 56 m	−62.6 MJ/kg
Orbiting at Earth's surface (equator)	6378 km	0 km	7.9 km/s (28,440 km/h or 17,672 mph)	1 h 24 m 18 s	−31.2 MJ/kg
Low Earth orbit	6600 - 8400 km	200 - 2000 km	Circular orbit: 7.8 - 6.9 km/s (17,450 - 14,430 mph) respectively elliptic orbit 6.5 - 8.2 km/s respectively	1 h 29 m - 2 h 8 m	−29.6 MJ/kg
Molniya orbit	6900 - 46,300 km	500 - 39,900 km	1.5 - 19.9 km/s (3335 - 22,370 mph) respectively	11 h 58 m	−4.7 MJ/kg
Geostationary	42,000 km	35,786 km	3.1 km/s (6935 mph)	23 h 56 m	−4.6 MJ/kg
Orbit of the Moon	363,000 - 406,000 km	357,000 - 399,000 km	0.97 - 1.08 km/s (2170 - 2416 mph) respectively	27.3 days	−0.5 MJ/kg

$$H_1 = \frac{7.644\times10^{22}\,\mathrm{A\cdot m^2}}{12.74\times10^{6}\,\mathrm{m}} = 6.0\times10^{15}\,\mathrm{A\cdot m}$$

Magnetic Pole Strength of Mercury [9]

$$H_2 = \frac{4\times10^{19}\,\mathrm{A\cdot m^2}}{4.88\times10^{6}\,\mathrm{m}} = 8.2\times10^{12}\,\mathrm{A\cdot m}$$

Distance between Earth and Mercury

$$r = 77\times10^{6}\,\mathrm{m}$$

$$\epsilon = 1.85\,\mathrm{m^2/s^2}$$

$$F = \frac{9\times10^{9}\,\mathrm{N\cdot m^2/A^2\cdot s^2}\times6.0\times10^{15}\,\mathrm{A\cdot m}\times8.2\times10^{12}\,\mathrm{A\cdot m}}{\left(77\times10^{9}\right)^2\times1.85\,\mathrm{m^2/s^2}}$$

$$F = 4\times10^{16}\,\mathrm{N}$$

The orbital distance between Earth and Mercury has a range of 77 - 222 million kilometers.

I have calculated Newton's force of gravity using an orbital distance of $r = 77$ million kilometers.

$$F = 2.2\times10^{16}\,\mathrm{N}$$

5. Calculate Force between Earth and Jupiter

Below, I calculate the force between Earth and Jupiter whereby,
Coulomb's Constant

$$k_e = 9\times10^{9}\,\mathrm{N\cdot m^2/A^2\cdot s^2}$$

Magnetic Pole Strength of Earth

$$H_1 = \frac{\left(7.644\times10^{22}\,\mathrm{A\cdot m^2}\right)}{12.74\times10^{6}\,\mathrm{m}} = 6.0\times10^{15}\,\mathrm{A\cdot m}$$

Magnetic Pole Strength of Jupiter

$$H_2 = \frac{\left(1.55\times10^{27}\,\mathrm{A\cdot m^2}\right)}{1.38\times10^{8}\,\mathrm{m}} = 1.12\times10^{19}\,\mathrm{A\cdot m}$$

Distance Earth and Jupiter

$$r = 588\times10^{9}\,\mathrm{m}$$

$$\epsilon = 12.4\,\mathrm{m^2/s^2}$$

$$F = \frac{\left(9\times10^{9}\,\mathrm{N\cdot m^2/A^2\cdot s^2}\times6.0\times10^{15}\,\mathrm{A\cdot m}\times1.12\times10^{19}\,\mathrm{A\cdot m}\right)}{\left(588\times10^{9}\,\mathrm{m}\right)^2\times12.4\,\mathrm{m^2/s^2}}$$

$$F = 1.4\times10^{20}\,\mathrm{N}$$

Orbital distance between Earth and Jupiter has a range of 588 - 968 million kilometers. Here, I calculate Newton's force of gravity using an orbital distance of r = 588 million kilometers.

$$F = 2.18\times10^{18}\,\mathrm{N}$$

6. Calculate Force between Earth and Saturn

Below, I calculate the Force between Earth and Saturn whereby,

Coulomb's Constant

$$k_e = 9\times10^{9}\,\mathrm{N\cdot m^2/A^2\cdot s^2}$$

Magnetic Pole Strength of Earth

$$H_1 = \frac{\left(7.644\times10^{22}\,\mathrm{A\cdot m^2}\right)}{12.74\times10^{6}\,\mathrm{m}} = 6.0\times10^{15}\,\mathrm{A\cdot m}$$

Magnetic Pole Strength of Saturn

$$H_2 = \frac{\left(4.6\times10^{25}\,\mathrm{A\cdot m^2}\right)}{1.2\times10^{8}\,\mathrm{m}} = 3.8\times10^{17}\,\mathrm{A\cdot m}$$

Distance Earth and Saturn

$$r = 1.2\times10^{12}\,\mathrm{m}$$

$$\epsilon = 5.25\,\mathrm{m^2/s^2}$$

$$F = \frac{\left(9\times10^{9}\,\mathrm{N\cdot m^2/A^2\cdot s^2}\times6.0\times10^{15}\,\mathrm{A\cdot m}\times3.8\times10^{17}\,\mathrm{A\cdot m}\right)}{\left(1.2\times10^{12}\,\mathrm{m}\right)^2\times5.25\,\mathrm{m^2/s^2}}$$

$$F = 2.7\times10^{18}\,\mathrm{N}$$

Orbital distance between Earth and Saturn has a range of 1.2 to 1.7 billion kilometres. Here, I calculate Newton's force of gravity using orbital distance of r = 1.2 billion kilometres.

$$F = 1.57\times10^{17}\,\mathrm{N}$$

7. Calculate Force between Earth and Uranus

Below, I calculate the Force of Earth and Uranus whereby,

Coulomb's Constant

$$k_e = 9\times10^9\ \mathrm{N\cdot m^2/A^2\cdot s^2}$$

Magnetic Pole Strength of Earth

$$H_1 = \frac{\left(7.644\times10^{22}\ \mathrm{A\cdot m^2}\right)}{12.74\times10^6\ \mathrm{m}} = 6.0\times10^{15}\ \mathrm{A\cdot m}$$

Magnetic Pole Strength of Uranus

$$H_2 = \frac{\left(3.9\times10^{24}\ \mathrm{A\cdot m^2}\right)}{5.0\times10^7\ \mathrm{m}} = 7.8\times10^{16}\ \mathrm{A\cdot m}$$

Distance Earth and Uranus

$$r = 2.6\times10^{12}\ \mathrm{m}$$

$$\epsilon = 4.3\ \mathrm{m^2/s^2}$$

$$F = \frac{\left(9\times10^9\ \mathrm{N\cdot m^2/A^2\cdot s^2}\times6.0\times10^{15}\ \mathrm{A\cdot m}\times7.8\times10^{16}\ \mathrm{A\cdot m}\right)}{\left(2.6\times10^{12}\ \mathrm{m}\right)^2\times4.3\ \mathrm{m^2/s^2}}$$

$$F = 1.4\times10^{17}\ \mathrm{N}$$

Orbital distance between Earth and Uranus has a range of 2.6 to 3.2 billion kilometers. I have calculated Newton's force of gravity using an orbital distance of $r =$ 2.6 billion kilometers.

$$F = 5.11\times10^{15}\ \mathrm{N}$$

8. Calculate Force between Earth and Neptune

Below, I calculate the Force between Earth and Neptune whereby,

$$k_e = 9\times10^9\ \mathrm{N\cdot m^2/A^2\cdot s^2}$$

Magnetic Pole Strength of Earth

$$H_1 = \frac{\left(7.644\times10^{22}\ \mathrm{A\cdot m^2}\right)}{12.74\times10^6\ \mathrm{m}} = 6.0\times10^{15}\ \mathrm{A\cdot m}$$

Magnetic Pole Strength of Neptune

$$H_2 = \frac{\left(2.2\times10^{24}\ \mathrm{A\cdot m^2}\right)}{4.9\times10^7\ \mathrm{m}} = 4.5\times10^{16}\ \mathrm{A\cdot m}$$

Distance Earth and Neptune

$$r = 4.3\times10^{12}\ \mathrm{m}$$

$$\epsilon = 5.6\ \mathrm{m^2/s^2}$$

$$F = \frac{\left(9\times10^9\ \mathrm{N\cdot m^2/A^2\cdot s^2}\times6.0\times10^{15}\ \mathrm{A\cdot m}\times4.5\times10^{16}\ \mathrm{A\cdot m}\right)}{\left(4.3\times10^{12}\ \mathrm{m}\right)^2\times5.6\ \mathrm{m^2/s^2}}$$

$$F = 2.4 \times 10^{16}\,\mathrm{N}$$

Orbital distance between Earth and Neptune has a range of 4.3 billion to 4.7 billion kilometers. I calculated Newton's force of gravity using orbital distance of r = 4.3 billion kilometers.

$$F = 2.15 \times 10^{15}\,\mathrm{N}$$

9. Calculate Force on Earth

Now, I calculate the Force of Earth on acting on a body near the surface whereby,

Coulomb's Constant

$$k_e = 9 \times 10^{9}\,\mathrm{N} \cdot \mathrm{m}^2 / \mathrm{A}^2 \cdot \mathrm{s}^2$$

Magnetic Pole Strength of Earth

$$H_1 = \frac{\left(7.644 \times 10^{22}\,\mathrm{A} \cdot \mathrm{m}^2\right)}{12.74 \times 10^{6}\,\mathrm{m}} = 6.0 \times 10^{15}\,\mathrm{A} \cdot \mathrm{m}$$

Magnetic Pole Strength of Body

$$H_2 = \frac{\left(\text{Magnetic Moment A} \cdot \mathrm{m}^2\right)}{\text{Length m}}$$

Distance from center of Earth

$$r = 6.371 \times 10^{6}$$

A theoretical value of specific orbital energy is assigned,

$$\epsilon = 148\,\mathrm{m}^2/\mathrm{s}^2$$

For sake of clarity we will reduce equation to its most basic assumed form for a magnetic object on the surface of the Earth. From a potential energy standpoint this would be slightly less than a meter from the Earth surface.

$$F = \frac{k_e H_1 H_2}{r^2 \epsilon}$$

$$F = \frac{k_e \times 6.0 \times 10^{15} \times H_2}{\left(6.371 \times 10^{6}\right)^2 \times 148}\,\mathrm{m}^2/\mathrm{s}^2$$

$$F = k_e \times H$$

Earth has a long history spanning billions of years. Over that time considerable change to the Earth's magnetism has occurred. The magnetic moment and pole strength have varied considerably, and researchers have been able to discern some of those changes in the more recent past. "The current episode of dipole moment decreases evidently commenced between 1000 and 2000$_{\mathrm{BP}}$, following an approximately 2000 year-long intervals when the average strength was high, nearly 11 × 10^{22} Am^2 according to the archaeomagnetic VADM, and nearly 9.5 × 10^{22} Am^2 according to the CALS7K.2 field model. The moment decrease has generally accelerated over the past millennium. This most recent maximum ended around 3500 $_{\mathrm{BP}}$ and was preceded by a longer period of intensity increase that commenced around 6000_{BP}, which in turn followed a shorter period of moment decrease starting around 9000_{BP}" [10]

In theory, the force on Earth is then proportional, and predicted to be equal, to the cross product of Coulomb's Constant and the body's magnetic pole strength. On the surface of the Earth, the proposed magnetic force equation is thus electrically analogous to Hooke's law or Newton's law when

$$\epsilon = 148\ \text{m}^2/\text{s}^2$$

This is a theoretical value which the author calculated as a possible value to overcome Earth's gravity. Coincidentally, NOAA uses a number of 150 m^2/s^2 and its equivalent 150 J/kg in its equation for what they call Specific Tornado Parameter. The term is defined as a multiple component index that is meant to highlight the co-existence of ingredients favoring right-moving supercells capable of producing class F2-F5 tornadoes. This a term used to describe lift-off of a parcel or a supercell, which is weather vernacular. Storm relative helicity is a measure of the potential for cyclonic updraft rotation in right-moving supercells and is calculated for the lowest 1 and 3 km layers above ground level. There is no clear threshold value for storm relative helicity when forecasting supercells since the formation of supercells appears to be related more strongly to the deeper layer vertical shear. However, larger values of 0 - 3 km storm relative helicity (greater than 250 m^2/s^2) and 0 - 1 km storm relative helicity (greater than 100 m^2/s^2) do suggest an increased threat of tornadoes with supercells. For storm relative helicity, larger is generally better, but there are no clear "boundaries" between non-tornadic and significant tornadic supercells [11] [12] [13].

Based on limited knowledge of severe weather, such as tornados, there seems to be correlation between lift off of magnetic particles and lift off of parcels in a tornado. Visualizing a large tornado to give a macro perspective of what might be occurring suggests that velocity of the electrons in a circular or cyclonic circle may be the key determinant in getting "lift" of a magnetic device. It is reasonable to view "lift-off" of water and gas molecules in air in the same vein as "lift-off" of electromagnetic particles. Given that the units are identical, and the terminology similar, we conclude that 148 m^2/s^2 is the magic number for anti-gravity.

Coulomb's constant k_e is akin to acceleration and mass is akin to magnetic pole strength. Area of the magnetic sphere is in the denominator as opposed to volume or some other shape. It is obvious that it is the area or outside of the sphere, which the electromagnetic waves bend and travel from one planet to the next. Electromagnetic energy is exchanged between planets to provide an attractive and repelling force, and this unique constant is addressed by way of the Specific Orbital Energy in the denominator.

The new equation is consistent with Andre Marie Ampere's reference to orbiting electrons causing inherent inductance or magnetism in matter. Testing and experimental work is required to prove such a fundamental and profound theory that may explain anti-gravity through powerful magnets. The basic equation can be mathematically explained in very simple terms as to why superconducting magnets levitate. It is concluded that increasing the magnetic field strength and/or decreasing the specific orbital energy will result in greater power of levitation.

10. Discussion and Conclusion

Application of a new equation to calculate planetary force has produced interesting results. Using measured magnetic moments from satellite data, all five planets are within reasonable range of Newton's Universal Law calculation. Surprisingly a couple of the planets are nearly identical, which for numbers with 20 zeros' are no small feat. To obtain exact calculations, specific energy values were initially hypothesized for each planet. The idealized values coincidentally lined up with what is known about planetary material makeup. For instance, Mercury is a rocky dry planet with a low expected specific energy of 3 - 6 J/kg for the entire planet. On the other end of the spectrum, Jupiter the largest and most fuel rich of planets has a Specific Gravity of 20 to 60 J/kg. Saturn, Uranus, Neptune and Earth fall near 10 J/kg, which align with what is known about their makeup [14].

Specific Energy (J/kg) was equated to Specific Orbital Energy (m^2/s^2) which led to investigation of Characteristic Energy and escape velocity. It was surmised that the application was unusual and centered around two planets orbiting the Sun. Escape velocity was calculated for the various planets and the repelling acceleration was simplified to a 1-meter Gravitational Potential Energy, which we designate in our equation as Specific Orbital Energy. The work assumes that Specific Energy (J/kg) = Specific Orbital Energy (m^2/s^2) = Gravitational Potential Energy (m^2/s^2). Given that the units of the last three terms are all the same it is rather easy to use the terms interchangeably, though it does create some confusion.

Adding to the confusion are the weather physicists who use the same units of (m^2/s^2) and (J/kg) to describe severe weather warnings such as Tornados. 150 m^2/s^2 is a number which has significance to lift off in parcels and supercells. This number nearly overlaps our theoretical lift off number for anti-gravity in the world of magnetics. It is the authors hope that publicizing this paper will lead to interest by physicists who are knowledgeable in specific energy so that the correct terms and explanations can be applied to our new theoretical equation of $F = k \times H$. It is believed that this is the correct equation for anti-gravity on Earth, though additional research and clarification of specific orbital energy (m^2/s^2) is required to fully understand and apply.

In the authors opinion there is a lack of standardization in the scientific community regarding the units of m^2/s^2. There are at least a half dozen names or terms in the various physics trade magazines and papers for the same basic unit. If this paper appears confusing in this matter it is because of a lack of standardization regarding a relatively simple SI unit. The standards committee needs to review the unit of m^2/s^2 to derive a standardized name, description and measurement standard. J/kg has been defined by the standards committee and aptly named Specific Energy. No such standard exists for its mathematical equivalent m^2/s^2. This issue needs to be addressed by the Consultative Committee for Electricity and Magnetism (CCEM) to eliminate confusion and set a standard for a unit of m^2/s^2.

When the reader overlooks all the misnomers, the lack of standards, and focuses purely on the units of m^2/s^2 then this paper is very straightforward. The Law of Universal Magnetism is just a simple Euclidian equation with a known constant, known distances between planets, measured pole strength's and a derivative of acceleration with units of m^2/s^2. It is just a matter of plugging in the numbers to derive results that approximate those of Newton's Law. When we use ϵ = 148 or 150 m^2/s^2, then our equation reduces to a classical form of $F = k \times H$. This is analogous to $F = ma$.

Planets, are electrical machines, [15] which can be modeled as dipole magnetics at great distances apart. The magnetic force between the dipole magnets can be calculated in similar fashion to Newton's law. The Law of Universal Magnetism includes a term in the denominator with units of m^2/s^2 which makes the equation a dynamic equation, as opposed to a static equation. In terms of theoretical physics, which can at times be incredibly complex, this is a very simple and straight forward concept to absorb.

The escape velocity of the dual electron particle and electromagnetic wave is what creates planetary gravity (g), and gravitational potential energy. This unexpected result confirms my paper [3] regarding small g as a centripetal acceleration derived from a blanket of electrons moving in a circular or bending pattern around the Earth. Electrons behave like satellites orbiting the Earth while at the same time exerting an inward or centering acceleration of 9.8 m/s^2. The key to understanding centripetal acceleration is that it is velocity dependent and mass has no bearing. It is the enormous and continuous volume and speed of electrons that create small g. Without the constant flow of orbiting electrons, we would have no electromagnetic field and no gravity. The escape velocity is slightly greater than that required to counter the centripetal acceleration g. Once the electron leaves, or breaks away, from the first planet, it enters the orbit of the second planet, and starts its bending patterns, which in turn is what creates local gravity or g for the second planet. It is the very near field which creates the blanket of electrons moving around the planet to create a centripetal force we call gravity.

The new equation gives credence that gravity is equivalent to magnetic force brought about by opposing parallel magnets, which we can view in the sky as rotating electrical machines. Electromagnetism is a known force of physics. Gravity's existence on the other hand has yet to be definitively proven after 350 years of study and attempts to measure it. Isaac Newton the father of gravity stated in 1692. In a letter to Richard Bentley, Newton wrote:

"*It is inconceivable that inanimate brute matter should, without the mediation* *of something else which is not material, operate upon and affect other matter, without mutual contact, as it must do if gravitation in the sense of Epicurus be essential and inherent in it. And this is one reason why I desired you would not ascribe "innate gravity" to me. That gravity should be innate, inherent, and essential to matter, so that one body may act upon another at a distance, through a vacuum, without the mediation of anything else, by and through which their action and force may be conveyed from one to another, is to me so great an absurdity, that I believe no man who has in philosophical matters a competent faculty of thinking can ever fall into it. Gravity must be caused by an agent acting constantly according to certain laws; but whether this agent be material or immaterial, I have left to the consideration of my readers*" [16].

We wish to communicate that J/kg and m^2/s^2 are also referred to as a specific orbital energy and are proportional to characteristic energy. In the two-body problem the specific orbital energy or *vis viva* energy of two orbiting bodies is the constant sum of their mutual potential energies and their total kinetic energy, divided by the reduced mass. A more precise calculation can be made using the specific orbital energy equation for an elliptic orbit which can be expressed:

$$\epsilon = \frac{v^2}{2} - \frac{Gm_1 + Gm_2}{r}$$

The specific orbital energy of two orbiting bodies is the constant sum of their energies (potential and kinetic), divided by the reduced mass. A series of calculations using elliptical relative velocity might be needed to obtain a more accurate m^2/s^2; thus, implying a door to incorporating velocity addition with electromagnetism. The work presented herein is consistent with Maxwell's electrodynamics and allows for inclusion of general relativity; a requirement of Coulomb's law for moving bodies. Further research, by an astrophysicist, into elliptical orbit of two bodies, Kepler's laws and relative velocity might prove helpful to further advance magnetic research and development. Two bodies—planets, magnets, or electrons—moving towards each other at constant speeds m/s will be seen as a third derivative of motion to create m^2/s^2.

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