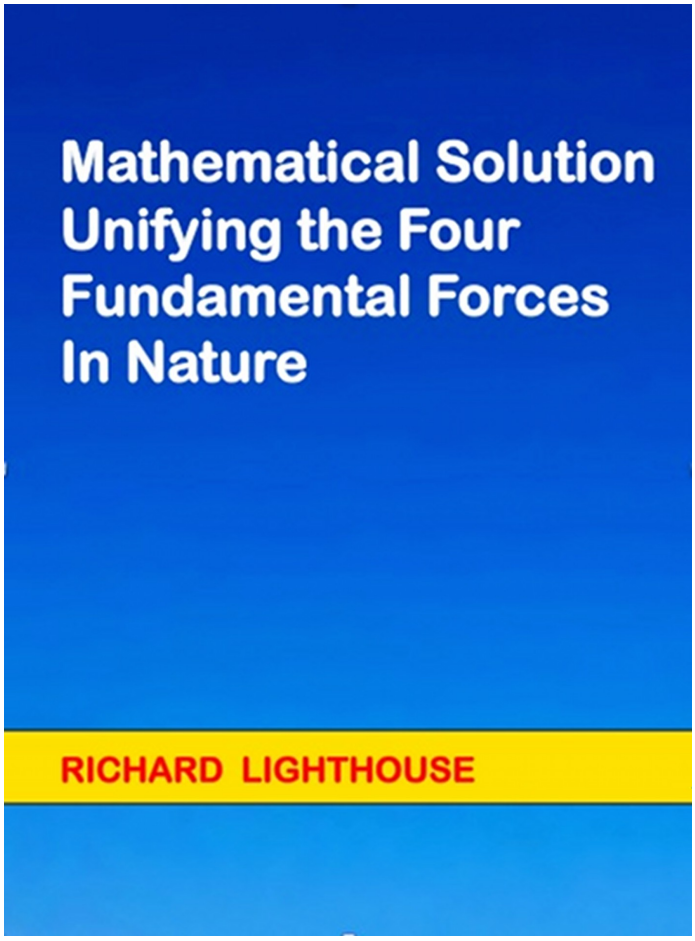

Mathematical Solution Unifying the Four Fundamental Forces in Nature

Richard Lighthouse

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"… to me that is the highest and most sacred duty—unifying physics. Simplicity is the criterion of the universe."

- Albert Einstein [1]

Abstract

This technical note describes a simple mathematical-geometrical solution for unifying the four fundamental forces in nature. The fundamental forces of gravitation, electromagnetism, strong force, and the weak force are actually different aspects of the same force. In general, the relationship between the four forces can be described using a form of the equation for Analog Quadrature Amplitude Modulation (Analog-QAM). This equation form is developed utilizing the concept of a "blinking" or discrete physical universe. The approach to develop the solution is described by minimizing the number of available dimensions (zero), which is in contrast to numerous efforts (String theory, M-theory, Quantum gravity) that attempt to maximize the number of dimensions under consideration. An Electrical Universe (EU) model is presented that provides sufficient conditions for a solution. This mathematical solution should be tested against experimental data to confirm its validity, however it is noted that, "discrete-time" forces will be measured differently than "time-averaged" forces in a laboratory environment. Confirmation of the theory is suggested through small, discrete-time interval measurements of the gravitational

acceleration force and the Electromagnetic Force, where they will be seen to vary continuously, and yet also retain a “time-averaged” value. Each reader must comprehend that our universe literally blinks off and on, more than 1 trillion times every second.

Introduction

A novel approach to modeling energy, forces, and matter is described in this technical note. The hypothesis behind this approach:

1) An Electrical Universe (EU) exists which forms the underlying structure for all physical universes, such as our own.

2) In our terms, this Electrical Universe consists of zero dimensions – a single point.

3) This Electrical Universe consists of electrical charges of varying intensity (Volts) and Range (Amp*sec).

Energy = Joules = Volts*Amp*sec

4) This EU exists independently from our physical universe, however, our physical universe “overlays” and is dependent upon the physics that reside within the EU.

5) All interactions for matter and physical universes are governed by the physics within the EU.

6) This single point varies in electrical charge intensity (Volts), creating a fundamental carrier wave that operates at 10^10000 or faster.

7) The Electrical Universe is an analog-continuous system, whereas our physical universe is a discrete-digital system. (Our universe literally blinks off and on at a high frequency)

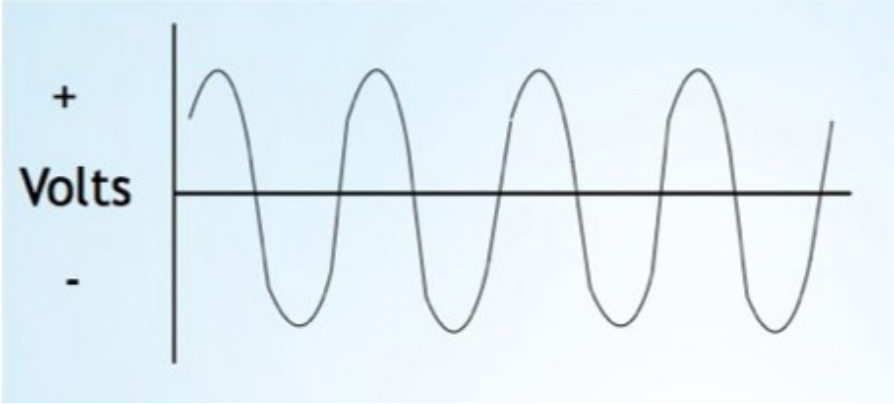

Figure 1. Note the voltage of this fundamental carrier wave operates at an extremely high frequency, in our terms, yet the average value is always zero. Therefore, this frequency could not be perceived or measured by any instrument.

Equation 1.1

$$\int V\,dt = 0$$

Simple AM Radio has been modeled for years as Double-Sideband Amplitude Modulation (DSB-AM). In using typical amplitude modulation, a signal is produced with power concentrated at the carrier frequency and two adjacent sidebands. These sidebands are equal in bandwidth to the modulation signal and are mirror images.

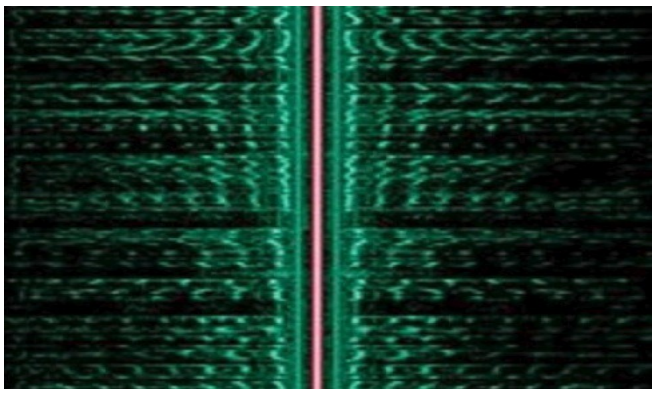

Figure 2. Spectrogram showing the two sidebands (green) of a typical AM signal, real and imaginary (sqrt -1), and the central carrier wave (red). [2]
For our purposes, note that this simple idea can readily explain the presence of matter and antimatter as mirror images that exist simultaneously in the Electrical Universe.

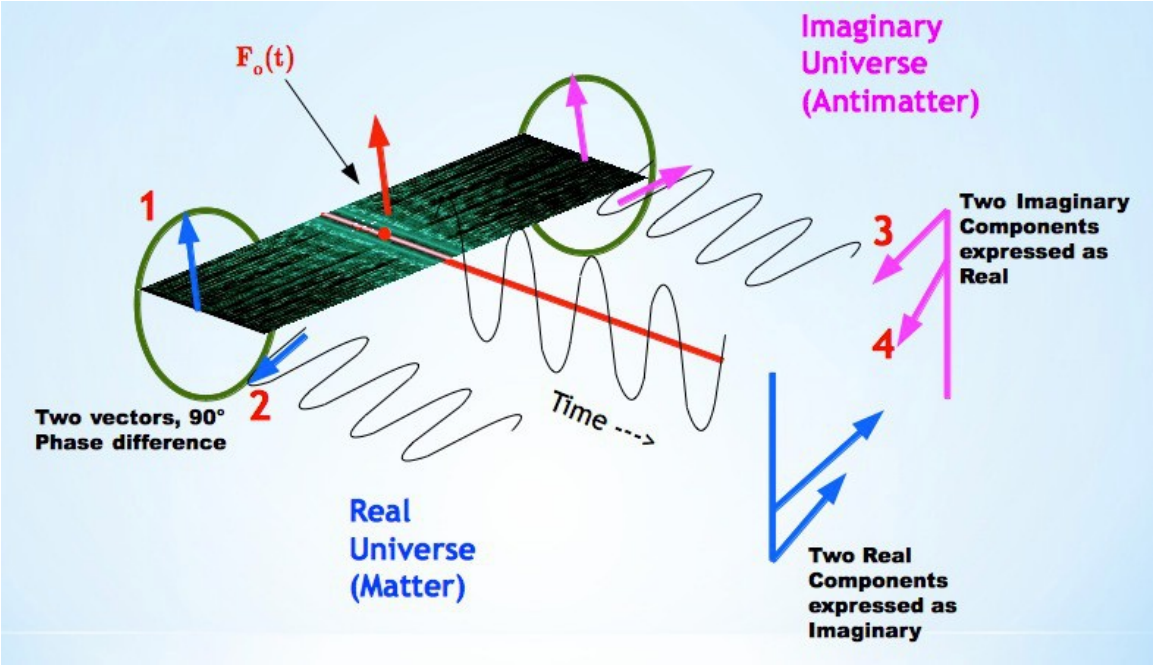

Figure 3. How 4 Fundamental Forces arise: (numbered in red)
The original single Force Vector, $F_o(t)$ in the Electrical Universe, which varies with time in our terms, is projected from an analog-continuous universe into a discrete-digital universe. From our perspective, when we attempt to "freeze" the force vector to measure its magnitude and direction, we lose the component of time variation. The vector is not then fully expressed. It must, therefore, split into two vectors with a 90-degree phase difference (sine versus cosine) to be fully expressed. These two vectors have mirror images in the imaginary universe (sqrt -1). In the imaginary universe, antimatter vectors also have two partial components that are continuously projected back into the real universe, in our terms. This gives us the perception of 4 total discrete vectors in a discrete physical universe, from the single analog force vector in the Electrical Universe. It is this translation from analog to discrete universe that causes a "dilemma of expression." This is similar to the effect causing a photon to display both wave and particle properties.

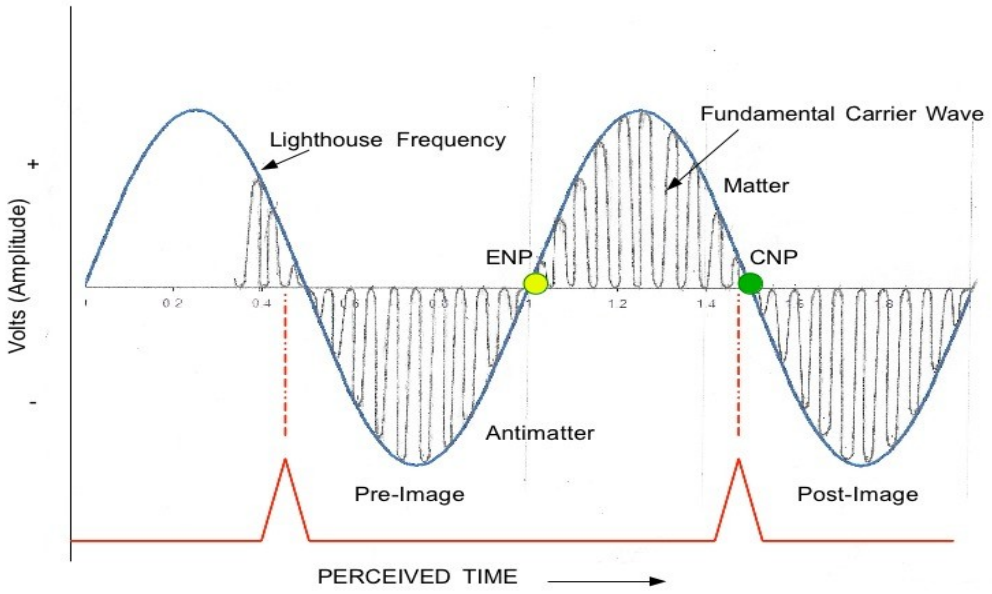

Figure 4.
Note the Fundamental Carrier Wave which operates at an extremely high frequency, in our terms - even faster than the blinking of our universe.

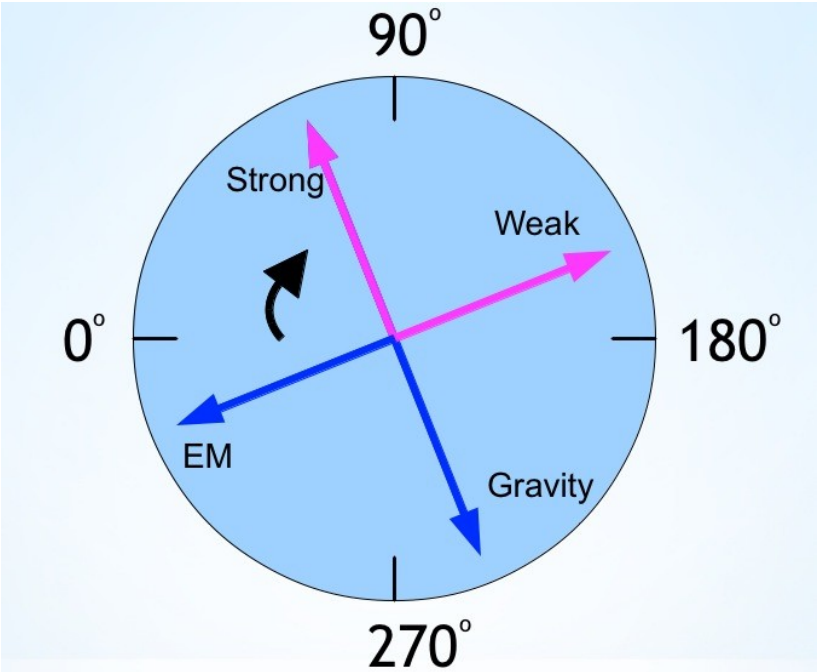

Figure 5. Think of the 4 forces as connected dials on a rapidly spinning clock, with gravity and the strong force as "opposites"; and EM and the weak force as "opposites." If we pause the clock and take the sine value of each; note that when gravity and the strong force are near their maximum values,

electromagnetism and the weak force will be near zero. The time-averaged values for EM and gravity, for example, will correspond to the Gravitational constant, and Coulomb's constant, in our terms. However, if we measure these forces discretely at a very high rate, we find they are constantly changing.

Special Cases

We can see from Figure 5, each of the forces varies continuously, in our terms. For gravitational acceleration, we will find when measured in small, discrete time intervals, it will vary between zero and a maximum value of approximately:

Equation 1.6

$$\frac{9.81 m/s^2}{\sin(45)} = \quad 13.87 \ m/s^2$$

However, the "time-averaged" value of gravitational acceleration will remain at 9.81 m/s^2

This analogy can be used to describe the other forces when measured in discrete time intervals. For example, Coulomb's Constant will seem to vary between zero and 12.71E9 Nm^2/c^2; while still having a time-averaged value of 8.988E9 Nm^2/c^2

In general, the forces can be described by the equation:

Equation 1.7

$$s(t) = [I(t) + iQ(t)]e^{i2\pi f_o t}$$

with a Real Component of:

Equation 1.8

$$= I(t)\cos(2\pi f_o t) - Q(t)\sin(2\pi f_o t)$$

where I(t) and Q(t) are the modulating signals and f_o is the carrier frequency. This is a form of the equation for Analog Quadrature Amplitude Modulation (Analog-QAM). [5]

In lab experiments, the magnitude for the strong force seems to be constant because it is being “time-averaged” in the same way that we experience gravity. However, if the forces are measured in small, discrete time intervals, it will be found they are constantly varying – each time the universe blinks on.

In the Electrical Universe:

Recall that the Electrical Universe consists of a single point. From the perspective of the Electrical Universe, when a force is initiated – there is no place to “move,” because there is no distance. It should be clear from Figure 3 then, Newton's Laws of Motion will apply. [4] These equations apply in the Electrical Universe, which is a single point.

For a stationary mass or particle at rest, the vector sum of all 4 fundamental forces will equal zero.

Equation 1.2

$$\vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \vec{F}_4 = 0$$

(Gravity + Electromag. + Strong + Weak = 0)

and in the case of an external force(s), where F5 is the net sum of other external forces:

Equation 1.3

$$\vec{F}_1 + \vec{F}_2 + \vec{F}_3 + \vec{F}_4 + \vec{F}_5 = 0$$

or in general:

Equation 1.4

$$\sum \vec{F}_n = 0$$

We can further conclude then, the sum of all moments will also be zero:

Equation 1.5

$$\sum M_n = 0$$

This equation is helpful when evaluating the angular momentum (spin) of elementary particles. In Figure 4, note that when our physical universe seems to "blink off," the antimatter universe "blinks on"; although the fundamental carrier wave, never stops and does not blink - it is continuous.

The above equations will apply in the Electrical Universe. We can deduce then, that an unbalanced force in the Electrical Universe must be resolved by creating a mass in a physical universe. Fundamental Forces and masses are therefore, two aspects of the same thing. [3]

Experimental Tests

The Electrical Universe model proposed in this paper shows that each of the four forces will vary continuously, in our terms. When testing the model against experimental data – it will be important to realize there is a significant difference between "time-averaged" force vectors, and discrete-time force vectors.
One possible test for the model is to identify discrete time intervals when the gravitational or electromagnetic force varies significantly from its "time-averaged" value.

Another possible test would be to identify a discrete time interval when two of the four forces had near-zero values simultaneously.

Conclusions

The fundamental forces of gravitation, electromagnetism, strong force, and the weak force are different aspects of the same force, which has its origin in the Electrical Universe.

1) In the Electrical Universe: For a mass or particle at rest, the vector sum of all four fundamental forces equals zero. This idea is Newton's Laws of Motion – applied to other universes.

2) The sum of all moments will also be zero.

A new model is proposed which describes an Electrical Universe consisting of zero dimensions, yet creating a fundamental carrier wave capable of supporting all universes. This mathematical solution should be tested against experimental data to confirm its validity, however it is noted; “discrete-time” forces will be measured differently than “time-averaged” forces in a laboratory environment. It is further noted that using the terms “Electrical Mass” for (Volts) and “Range” for (Amp*sec), may be helpful in understanding phenomena in the Electrical Universe.

Equation 2.1

Energy = Joules = (Volts) * (Amp*sec)

= (Electrical Mass)*(Range)

Simple tests can be conducted in the laboratory to confirm the four forces are varying continuously, yet also have a time-averaged value. Only by analyzing small, discrete-time intervals will the phenomena be observed. In closing, it can be said that researchers could not discover the simple connection between the four forces, because they were looking for answers in the wrong universe. The Electrical Universe held the solution.

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4. Newton, Sir Isaac (1729). “The Mathematical Principles of Natural Philosophy, Volume II.” https://archive.org/details/newtonspmathema00newtrich

5. Wikipedia.org; Analog Quadrature Amplitude Modulation (Analog-QAM), https://en.wikipedia.org/wiki/Quadrature_amplitude_modulation [Note also that Digital-QAM can provide a simple and accurate model for standard elementary particles.]

6. Lighthouse, Richard. “Preliminary Investigation into the Nature of Time,” www.lulu.com, 2010.

Acknowledgments

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Historical Note: The equation relating the four forces was realized on 12 August 2013.

APPENDIX

A-1: The Connection between Electromagnetism and Gravity

Some comments about Equation 1.2 and 1.3 may be: the sum of the 4 force vectors could not possibly equal zero, because the values differ by orders of magnitude. A response:

First of all, F5 is almost always non-zero, even in a laboratory environment. This is one reason why the measurements obtained for fundamental forces are in error.

We will consider a special case that demonstrates how they derive from the Electrical Universe, and the problem is merely a “perception of distance” (there is no distance in the Electrical Universe):

Consider the basic equations for the gravitational force and electromagnetic force.

Equation A.1

$$F = G\frac{m_1 m_2}{r^2}$$

Equation A.2

$$F = \frac{\mu q_{m1} q_{m2}}{4\pi r^2}$$

Anyone examining these two equations would rationally observe they are quite similar in form.

Note that as r becomes microscopically small and approaches zero, the magnitudes and values become closer and closer. If fact, the limit as r approaches zero, is that all 4 forces have the same magnitude and become one force.

Equation A.3

$$\lim_{r \to 0} F_n = F$$

= = = = = = =

A-2: Simulation

What we have done then, is to simulate the Electrical Universe from within a Physical Universe. The criteria for simulation is:

A2.1 Since all objects and events exist within a single point, the distance between objects is zero
A2.2 There is no time in the Electrical Universe, so utilizing small discrete time intervals is necessary
A2.3 Electrical Mass (Volts) & Range (Amp*sec) are the only properties that are

fundamental in the Electrical Universe, in our terms.

There may be other criteria as well, but we will leave the improved definition for simulation to future researchers.

A-3: Heisenberg Uncertainty Principle

Thus far, no one has identified a reason for this principle, which has repeatedly shown itself to be true within a physical universe. However, since there is no distance in the Electrical Universe and there is no velocity – we always know precisely where an electron is located and its precise velocity at the same time. Therefore, we can deduce that the Uncertainty Principle is an effect caused by making a translation between an analog-continuous universe and a physical-discrete universe.

A-4: The Duality of Photons

Within the Electrical Universe, a photon is an electromagnetic wave. Only within a physical universe does it display properties of matter.

A-5: Quantum Entanglement

Within the Electrical Universe, there is no distance, so the idea of two particles acting at a distance is not absurd. (or possibly the same particle displaying two of its probable locations)