A Theorem of Mass Being Derived From Electrical Standing Waves

(As Applied to Jean Louis Naudin's Test)

- by -

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This Analysis Proposes The Necessary
Changes Required For A Working Test

This paper formalizes a concept presented in my book, "Electrogravitation As A Unified Field Theory", (as well as in numerous related papers), the concept of mass being the result of standing waves. More exactly, the result of electrical standing waves.

First, the electric mass equation developed in previous papers will be presented in terms related directly to the rest mass energy of the electron. This is done so as to establish the fact that ordinary parameters such as the permeability of free space, the charge squared of an electron, and the classic electron radius directly establish the mass of the electron. Then we will develop an actual standing wave on a transmission line of arbitrary load resistance and line impedance. Using currents derived from charge and time related to frequency, the mass-gain involving the current squared times the wavelength squared feature of the developed mass-energy equation will be presented. This suggests that an electrical mass creation may be nonlinear to the forth power by reason of the current squared times the length squared.

Then the naturally negative mass feature involving the phasor form of purely reactive current is presented which suggests that purely reactive energy has a built-in negative mass associated with its field. From that, we launch into a transmission line analysis involving standing waves and examine the results of a standing voltage and current wave given some arbitrary input voltage, line impedance, and load. From the current derivation, we utilize the mass-energy equation to plot a resulting mass wave buildup on the transmission line. Note that in Mathcad, the parameters of the equations are active and can be changed for analysis purposes. If you do not have your own Mathcad 6.0+ or later, you can download the Mathcad Explorer for free from Mathcad website. (Link at: http://www.electrogravity.com).

This particular analysis is specific to Jean Louis Naudin's test. Jean Louis Naudin's website has the equation solver at: http://members.aol.com/jnaudin509/systemg/html. The parameters related to his page are used in the below analysis.

I am assuming that the test reported by Fran De Aquino is the only test with positive results since no verification (to my knowledge) has been made as of this date.

The Electric Equivalent of Mass

$\mu_o := 1.256637061 \cdot 10^{-06} \cdot henry \cdot m^{-1}$	Magnetic permeability.
$m_e := 9.109389700 \cdot 10^{-31} \cdot kg$	Electron rest mass.
$q_o := 1.602177330 \cdot 10^{-19} \cdot coul$	Electron charge.
$c := 2.997924580 \cdot 10^{08} \cdot m \cdot sec^{-1}$	Speed of light in a vacuum.
$h := 6.626075500 \cdot 10^{-34} \cdot joule \cdot sec$	Plank constant.
$l_q := 2.817940920 \cdot 10^{-15} \cdot m$	Classical electron radius.

Let: $n_q := 1$ — Current multiplier for analysis.

Let: $t_x := \dfrac{h}{m_e \cdot c^2}$ $\quad t_x = 8.09330099961637 \cdot 10^{-21} \cdot sec$ eq. 1

and: $i_q := \dfrac{n_q \cdot q_o}{t_x}$ $\quad i_q = 19.79633934380971 \cdot amp$ eq. 2

Now let: $m_e \cdot c^2 = \left(\mu_o \cdot \dfrac{i_q^{\,2}}{4 \cdot \pi \cdot l_q}\right) \cdot (d)^2$ Solving for d: eq. 3

has solutions)

$$\begin{bmatrix} \dfrac{-2}{\left(\sqrt{\mu_o} \cdot i_q\right)} \cdot \sqrt{\pi} \cdot \sqrt{l_q} \cdot \sqrt{m_e} \cdot c \\ \dfrac{2}{\left(\sqrt{\mu_o} \cdot i_q\right)} \cdot \sqrt{\pi} \cdot \sqrt{l_q} \cdot \sqrt{m_e} \cdot c \end{bmatrix}$$

Note that the m_e term is proportional to the square of the current term since c^2 is a constant.

Where:

$$\frac{-2}{\left(\sqrt{\mu_o} \cdot i_q\right)} \cdot \sqrt{\pi} \cdot \sqrt{l_q} \cdot \sqrt{m_e} \cdot c = -2.426310601573248 \cdot 10^{-12} \cdot m \qquad \text{eq. 4}$$

and:

$$\frac{2}{\left(\sqrt{\mu_o} \cdot i_q\right)} \cdot \sqrt{\pi} \cdot \sqrt{l_q} \cdot \sqrt{m_e} \cdot c = 2.426310601573248 \cdot 10^{-12} \cdot m \qquad \text{eq. 5}$$

Check: $d := \dfrac{h}{m_e \cdot c}$ $\quad d = 2.426310600008849 \cdot 10^{-12} \cdot m$ eq. 6

(= Compton wavelength of the electron.)

Quantum mass check of the above:

$$m_x := \left(\mu_o \cdot \frac{i_q^{\,2}}{4 \cdot \pi \cdot l_q}\right) \cdot \left(\frac{d}{c}\right)^2 \qquad m_x = 9.109389688253175 \cdot 10^{-31} \cdot kg \qquad \text{eq. 7}$$

(= rest mass of the electron.)

Note that the mass is proportional to the current squared for a fixed wavelength, d. Then related to current, the mass would increase exponentially.

Let us calculate the effective mass related to the current squared in an antenna with the following arbitrary parameters:

Let: $i_{ant} := 1 \cdot 10^{02} \cdot amp$ and $f_{ant} := 1 \cdot 10^{04} \cdot Hz$

Then: $d_{ant} := \frac{c}{f_{ant}}$ or, $d_{ant} = 2.99792458 \cdot 10^{4} \cdot m$

Then the effective mass is given by:

$$m_{ant} := \left(\mu_o \cdot \frac{i_{ant}^{\,2}}{4 \cdot \pi \cdot l_q}\right) \cdot \left(\frac{d_{ant}}{c}\right)^2 \qquad \text{eq. 8}$$

Note: The calculation uses <u>real</u> parameters since we are considering the case for antenna action.

or, $m_{ant} = 3.548690437601892 \cdot 10^{3} \cdot kg$ (A significant mass increase over the mass of the electron.)

Note also that the above macroscopic effective mass calculation now is proportional to the square of the current as well as the square of the wavelength. <u>If we consider the case for purely inductive or capacitive current, then the following applies:</u>

Let: $\theta := \frac{\pi}{2}$ and $i_{sw} := i_{ant} \cdot e^{j \cdot \theta}$ (+ = Inductive case)

then: $i_{sw} = 6.123031769111886 \cdot 10^{-15} + 100j \cdot amp$

Then the effective mass related to purely reactive current wave is given below as:

$$m_{sw} := \left(\mu_o \cdot \frac{i_{sw}^{\,2}}{4 \cdot \pi \cdot l_q}\right) \cdot \left(\frac{d_{ant}}{c}\right)^2 \qquad \text{eq. 9}$$

or, This is the case for a non-radiating 'antenna' that is totally inclosed in a shield.

$$m_{sw} = -3.548690437601892 \cdot 10^{3} + 4.34574885763599 \cdot 10^{-13} j \cdot kg$$

Note for a purely reactive current wave, the effective mass is negative and real. This implies that a powerful enough wave should be able to reverse the attraction of gravity since the effective field mass is negative.

As an example, let us calculate the force of repulsion at the surface of the Earth for the above mass. First we establish related parameters as:

$G := 6.672590000 \cdot 10^{-11} \cdot newton \cdot m^2 \cdot kg^{-2}$ Gravitational constant.

$R_E := 6.37 \cdot 10^6 \cdot m$ Mean radius of the Earth.

$M_E := 5.98 \cdot 10^{24} \cdot kg$ Mass of the Earth.

Then the force on the surface of the earth related to the negative effective mass calculated above is given by the equation below as:

$$F_E := \frac{G \cdot M_E \cdot m_{sw}}{{R_E}^2} \quad \text{or,} \qquad \text{eq. 10}$$

$$F_E = \left(-3.4896741455283 \cdot 10^4 + 4.273477131383632 \cdot 10^{-12} j\right) \cdot newton$$

which is a real and negative force of repulsion by reason of the standard equation result is normally positive and one of attraction.

If we allow for a 0 or 180 degree (0 or π = half wavelength) in theta above, the force will be one of attraction since the effective mass will be positive. Inserting a theta (θ) of ($\pi/2$ or $-\pi/2$ = quarter wavelength) will yield an effective negative mass.

Then if the top of a UFO style craft had a real component field while the bottom had a reactive field, the top would attract and the bottom would repel other normal mass.

The following is an analysis of how mass is created by standing wave of current in a transmission line with the parameters of Fran De Aquino's test 0f 01-27-2000.

The voltage and currents along the line with respect to time are given by the following equations below, which is the sum of the forward and reverse propagating waves.

z = any point on line.

$$V\left(z_{vec}\right) = V_{plusvec} \cdot e^{-j \cdot \left(\frac{\omega}{u}\right) \cdot z} + V_{negvec} \cdot e^{j \cdot \left(\frac{\omega}{u}\right) \cdot z} \qquad \text{eq. 11}$$

Rc = line impedence.

$$I\left(z_{vec}\right) = \frac{V_{plusvec}}{R_c} \cdot e^{-j \cdot \left(\frac{\omega}{u}\right) \cdot z} - \frac{V_{negvec}}{R_c} \cdot e^{j \cdot \left(\frac{\omega}{u}\right) \cdot z} \qquad \text{eq. 12}$$

where the $V_{plusvec}$ and V_{negvec} terms are generally complex numbers as:

$$V_{plusvec} = V_{mplus} \cdot e^{j \cdot \theta} \quad \text{and} \quad V_{negvec} = V_{mneg} \cdot e^{-j \cdot \theta}$$

Related to the above equations, various related parameters are defined as:

$f := 50.0$	Frequency (Hz)
$\omega := 2 \cdot \pi \cdot f$	Angular frequency (rad/sec)
$u := 5.1301993 \cdot 10^{03}$	Propagation vel. of transmission line * = See p.9
$\zeta := 16.0$	Actual length of line (m)
$R_c := 1.5 \cdot (1.5)$	Characteristic Z (adjusted) of transmission line (ohms)
$Z_L := 1 \cdot 10^{08} + j \cdot 0$	Approx. open circuit Load impedance (ohms).
$V_S := 120 \cdot (2)$	Input source voltage x 2. (Unloaded voltage.)
$\beta := \frac{\omega}{u}$	Phase constant

where, $\beta = 0.06123724381604$ rad/m

Line length as actual electrical wavelength is given as:

$$\lambda := \frac{u}{f} \quad \text{or,} \quad \lambda = 102.603986 \quad \text{(m)} \qquad \text{eq. 13}$$

The line ratio of actual length to electrical wavelength is:

$$\frac{\zeta}{\lambda} = 0.155939360874343$$ (Becoming close to 1 / 2π like Fran's test.) eq. 14

The reflection coefficient at the load and the input is calculated next:

$$\Gamma_L := \frac{Z_L - R_c}{Z_L + R_c} \qquad \Gamma_L = 0.999999955000001 \qquad \text{(Load)} \qquad \text{eq. 15}$$

Next we define z as any point along the line. Then:

$$\Gamma(z) := \Gamma_L \cdot e^{j \cdot 2 \cdot \beta \cdot (z - \zeta)}$$ which is the generalized voltage reflection coefficient. eq. 16

Then the reflection coefficient at the input to the line is:

$$\Gamma(0) = -0.379074046739592 - 0.925366293468956j$$ (Input) eq. 17

The voltage standing wave ratio (VSWR) is:

$$VSWR := \mathrm{if}\left(\left|\Gamma_L\right| \neq 1, \frac{1+\left|\Gamma_L\right|}{1-\left|\Gamma_L\right|}, \infty\right)$$ eq. 18

$$VSWR = 4.444444448211589 \cdot 10^{7}$$ (Line is open-ended at load.)

The nominal line input impedance is calculated to be:

$$Z_{in} := R_c \cdot \frac{1+\Gamma(0)}{1-\Gamma(0)}$$ (Z_{in} below is adj. close to test value.) eq. 19

$$Z_{in} = 7.34188269252466 \cdot 10^{-8} - 1.509762462114996j$$ (ohms)

Next, we determine the time domain voltage at the line input and at the load:

First the source end reflection coefficient is calculated as:

$$\Gamma_S := \frac{Z_{in} - R_c}{Z_{in} + R_c} \qquad \Gamma_S = -0.379074046739592 - 0.925366293468956j$$ eq. 20

Voltage anywhere along the line is:

$$V(z) := \frac{1 + \Gamma_L \cdot e^{-j \cdot 2 \cdot \beta \cdot (\zeta - z)}}{1 - \Gamma_S \cdot \Gamma_L \cdot e^{-j \cdot 2 \cdot \beta \cdot \zeta}} \cdot \frac{R_c}{Z_{in} + R_c} \cdot V_S \cdot e^{-j \cdot \beta \cdot z}$$ eq. 21

Then the input V(z) is:

$$V(0) = 120 - 2.699663409488906 \cdot 10^{-15} j$$ (= V_{in}) eq. 22

The input phase is:

$$\mathrm{if}\left(\left|V(0)\right| \neq 0, \frac{\arg(V(0))}{\deg}, 0\right) = -1.288994328913437 \cdot 10^{-15}$$ eq. 23

The absolute load voltage is:

$$|V(\zeta)| = 215.3656040359876$$

Note that the voltage at multiples of a <u>quarter-wavelength</u> on the line is equal to the input voltage times the VSWR, which could rise to extreme values. eq. 24

The load phase is:

$$\mathrm{if}\left(|V(\zeta)| \neq 0, \frac{\arg(V(\zeta))}{\deg}, 0\right) = -1.921228615021332 \cdot 10^{-6}$$ eq. 25

Since we have an expression for the voltage anywhere on the line, (eq. 21), then the current at the load and input may be expressed as:

(amp)

$$I_{in} := \frac{V(0)}{Z_{in}} \qquad I_{in} = 3.865195285540423 \cdot 10^{-6} + 79.4827020880451j$$ eq. 26

(amp)

$$I_L := \frac{V(\zeta)}{Z_L} \qquad I_L = 2.153656040359875 \cdot 10^{-6} - 7.221588826988867 \cdot 10^{-14} j$$ eq. 27

The time averaged load and input power is given below as: eq. 28

$$P_{av}(\zeta) := \frac{1}{2} \cdot \left[V(\zeta) \cdot \left(\overline{I_L} \right) \right] \qquad P_{av}(\zeta) = 2.31911717008929 \cdot 10^{-4} - 1.662918788205893 \cdot 10^{-27} j$$

eq. 29

$$P_{im}(\zeta) := \frac{1}{2} \cdot \left[V(\zeta) \cdot \left(\overline{I_{in}} \right) \right] \qquad P_{im}(\zeta) = 1.292193620247765 \cdot 10^{-4} - 8.558920072802152 \cdot 10^{3} j$$

The plot of phasor domain voltage and current is presented below.

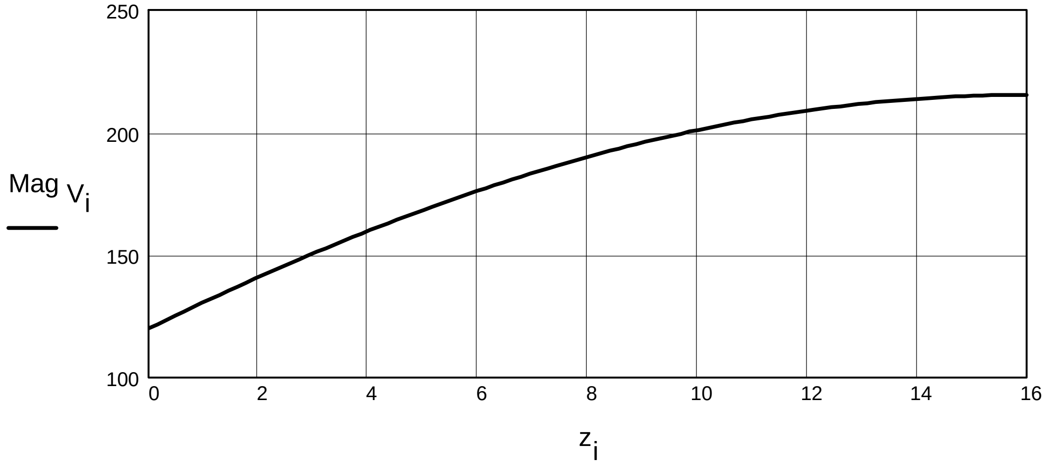
$$npts := 100 \qquad z_{start} := 0 \qquad z_{end} := \zeta$$

$$i := 0 .. npts - 1 \qquad z_i := z_{start} + i \cdot \frac{z_{end} - z_{start}}{npts - 1}$$

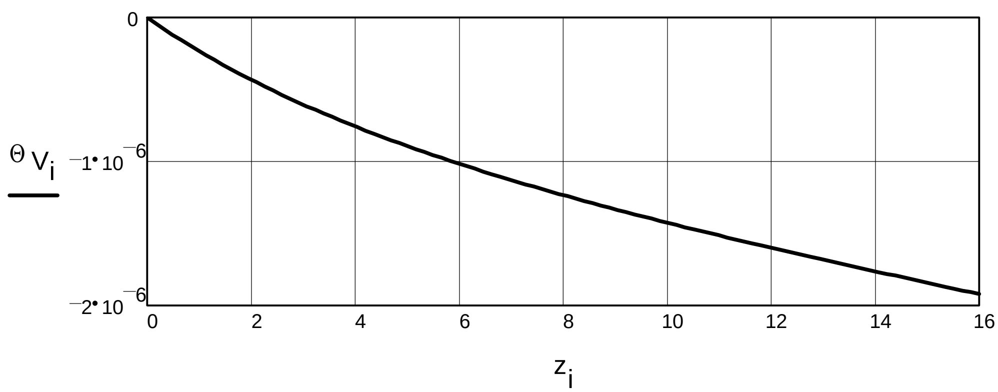
$$Mag_{V_i} := V(z_i)$$ (Voltage magnitude along the line from start to end)

$$\Theta_{V_i} := \mathrm{if}\left(|V(z_i)| \neq 0, \frac{\arg(V(z_i))}{\deg}, 0\right)$$ (Voltage phase along line) eq. 30

Voltage magnitude along the 12 meter long transmission line is:



Voltage phase along the transmission line.



Next the current along the transmission line may be given by:

$$\text{Mag } I_i := \frac{\text{Mag } V_i}{R_c \cdot \left(\frac{1 + \Gamma(z_i)}{1 - \Gamma(z_i)}\right)} \qquad \text{eq. 30}$$

Equivalent to:

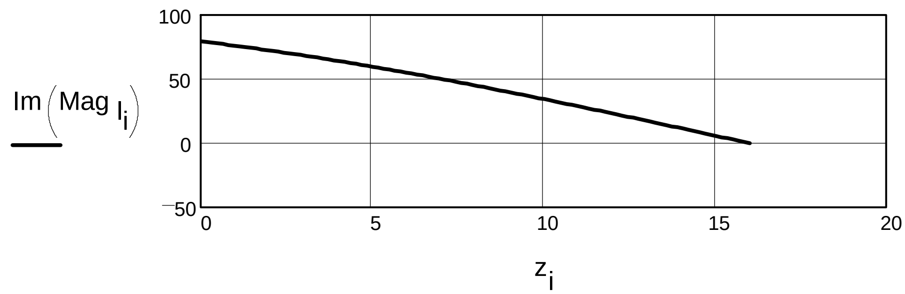
$$I(z_i) = \frac{V(z_i)}{Z(z_i)} \qquad \text{eq. 31}$$

Where again:

$$I_{in} = 3.865195285540423\cdot 10^{-6} + 79.4827020880451j$$

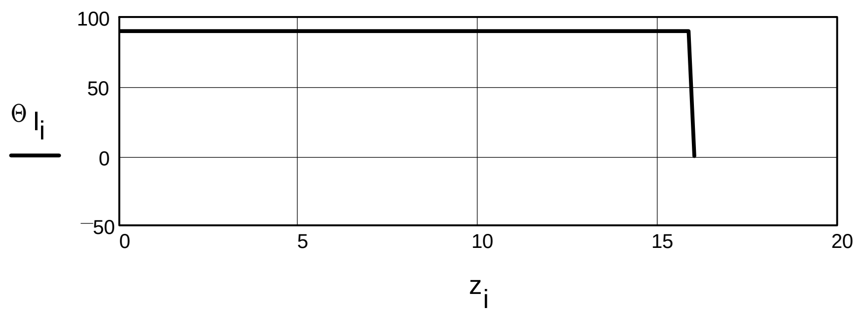
$$I_L = 2.153656040359875\cdot 10^{-6} - 7.221588826988867\cdot 10^{-14}j$$

Plot of the reactive Mag_{I} current along line:



The current phase is derived as: $\Theta_{I_i} := \text{if}\left(\left|Mag_{I_i}\right| \neq 0, \dfrac{\arg\left(Mag_{I_i}\right)}{deg}, 0\right)$ eq. 32

The current phase plot is provided below as:

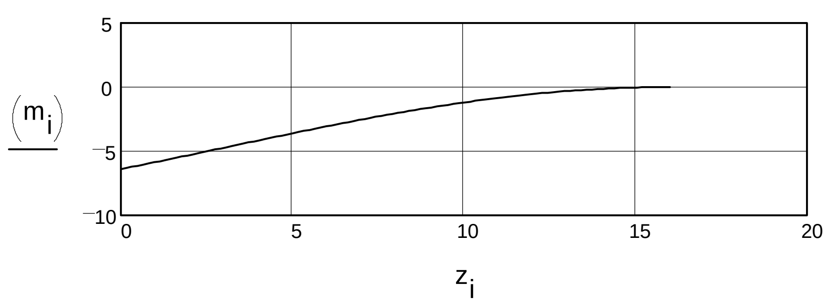


Based on the line amps calculated above at the given line length, the effective field mass in the transmission line can be calculated as:

Where the adjusted permeability is: $\mu_{iron} := 10000$ and $\mu_o := 4\cdot\pi\cdot 1\cdot 10^{-07}$

$I_q := 2.817940920\cdot 10^{-15}$ $c := 2.997924580\cdot 10^{08}$

$$m_i := \left[\mu_{iron}\cdot\mu_o\cdot\frac{\left(Mag_{I_i}\right)^2}{4\cdot\pi\cdot I_q}\right]\cdot\left(\frac{\zeta}{c}\right)^2$$ (= negative mass in kg.) eq. 33



The adjusted permeability is the average permeability of the iron powder + sheild.

The average negative field mass in kg along the line is given by: eq. 34

$$m_{avg} := \left(\sum_i m_i\right)\cdot npts^{-1} \qquad m_{avg} = -2.451407579998627 + 3.105351311663332\cdot 10^{-7} j$$

(In kg.)

The final result in equation (34) demonstrates that if the torus geometry is not treated as an antenna, but rather as a transmission line, then negative mass occurs naturally via the reactive terms as shown above.

APPENDIX: The following presents further rationale of why the torus test can be analyzed as if it is a transmission line.

Below are the new parameters that would allow Jean Louis Naudin's test to approach the working phase of Fran De Aquino's test.

$V_{in} := 120$ Input voltage

$R_{loss} := 0.30$ (Old value = 1.1815 ohm) Element ohmic resistance, ohms

$I_{in} := 80$ Element current, amps

$P_{in} := V_{in}\cdot I_{in} \qquad P_{in} = 9.6\cdot 10^3$ Power Input, VA

The angle related to the VA input and the resistive loss is: eq. 35

$$\theta := \mathrm{acos}\left(\frac{I_{in}^{\;2}\cdot R_{loss}}{P_{in}}\right) \qquad \theta = 78.4630409671845\cdot deg$$

This phase angle is close compared to the 77.789 deg. of De Aquino test.

Now that we have the angle above, we can calculate the inductive reactance related to the input Z. (This new phase angle is also close to 1 / 2π.)

$Z_{in} := 1.5$ Assumed input impedance.

$$X_L := Z_{in}\cdot \sin(\theta) \qquad X_L = 1.469693845669907 \text{ ohm} \qquad \text{eq. 36}$$

$$L_{line} := \frac{X_L}{2\cdot\pi\cdot f} \qquad L_{line} = 4.678180807402056\cdot 10^{-3} \text{ henry} \qquad \text{eq. 37}$$

The above inductance is quite reasonable considering the entire element assembly is surrounded with powdered and pure iron. Then we calculate the capacitance related to the inductance by using standard transmission line equations on the next page. (The inductance may be raised by wrapping the wire around an iron rod.)

$$C_{line} := \frac{L_{line}}{Z_{in}^{2}} \qquad C_{line} = 2.079191469956469 \cdot 10^{-3} \quad \text{farad} \qquad \text{eq. 38}$$

The resonant frequency related to the calculated inductance and capacitance is:

$$f_r := \frac{1}{2 \cdot \pi \cdot \sqrt{L_{line} \cdot C_{line}}} \qquad f_r = 51.0310363079829 \quad \text{Hz} \qquad \text{eq. 39}$$

(Frans' test was 61.3889 Hz.: very close to 60 Hz.)

The phase velocity is calculated next.

$$u_p := \frac{1}{\sqrt{\left(\frac{L_{line}}{\zeta}\right) \cdot \left(\frac{C_{line}}{\zeta}\right)}} \qquad u_p = 5.130199320647457 \cdot 10^{3} \quad \text{m/sec} \qquad \text{eq. 40}$$

* NOTE: The above value of phase velocity is the value used on page 4 previous.

The large value of capacitance is also possible since in Fran De Aquino's test, the very thin film of paint around the elements allows for the E field to transfer to the conductive iron powder and thus to the nearby opposite element so that it would appear as if the elements were very close to each other.

The line Rc on page 4 was adjusted to reflect the line Z of the elements so they would represent an actual transmission line. This is also a very possible value. Finally, the input voltage on page 4 represents the unloaded value and is halved when connected to the line which yields the same input voltage as given by the original torus test parameters. This is shown by the voltage plot on the top of page 7.

Conclusions:

Treating Fran De Aquino's test torus as a transmission line yields a <u>negative field mass directly</u> without resorting to the assumption that the iron atoms in the shield must *absorb energy*. To absorb energy, the atoms must convert that energy to vibratory motion which translates into heat build which means that they will be subject to temperature rise. Fran De Aquino assures us that the torus and shield do not get hot. Therefore the power is reactive and the transmission line equations above use that property to arrive at the negative field mass results in a straightforward manner.

I suggest that this analysis more accurately describes the results of Fran De Aquino's test much better than assuming that the action of antenna radiation occurs. The mechanics of antenna radiation involve non-reactive radiation, i.e., *real* power.

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NOTE: The original work that supports this concept is chapter 7 of my book, "Electrogravitation As A Unified Field Theory."

ADDITIONAL COMMENTS:

The reason that Jean Louis Naudin's test did not replicate Fran De Aquino's test may be that the cosine of the phase angle between the volt-amperes and the resistive power should be close to the ratio of 1 / (2pi). This would ensure that the calculated frequency related to the inductance and capacitance parameters for ordinary resonance are close to the actual input frequency. Then like the action of a pendulum, the mass-wave will be "kicked" into its next cycle at the proper time.

I am reminded of when the orbits of the atoms were found to have standing waves related to the calculated DeBroglie wavelength and that those wavelengths had to be a whole number multiple of some number n. It was found to be m v r = n h / 2pi, or the angular momentum was equal to n h / 2pi.

The mass wave likely died out in Jean Louis test since the phase angle was not close to the 1 / 2pi which would allow it to fit within the 'cycle' of operation properly. <u>Lowering the copper loss</u> will boost the input current while at the same time it will sustain the standing wave as shown above. -- Jerry E. Bayles.