STUDY of GRAVITY

Space Propulsion and Energy Science International Forum

(BOE 021209-054)

MIKE GAMBLE

2/26/09

Mg09

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BOEING Release Memo

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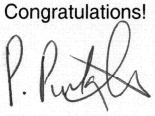

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SPESIF PITCH NOTES 2/26/09

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STUDY OF GRAVITY

INTRODUCTION

Hello, my name is Mike Gamble, I am an electronics engineer for The Boeing Co. (Seattle). A week ago I had no idea that I would be here to present this study. Would like to thank the chair person of this conference for pulling the right strings. This presentation is from a different perspective more of a macroscopic overview. Enjoy the gravity presentation and let me know what you think about it.

HISTORY

I started this "Study of Gravity" back in 2007 more as a curiosity than research. Looking in textbooks all you find about gravity is the statement that it is an attraction between two bodies and varies as the mass and separation. I thought there must be more to it, so I started collecting data about the earth. In engineering you start with a ballpark number (WAG or SWAG) and work the problem from there. Being of the electronics type I was trained to think in terms of waves, harmonics and frequencies. The "wow moment" in the research came when I realized that the harmonic waveshapes were aligning very close to that of the measured data. After that things got real interesting!

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Steps in Understanding Gravity

- **Document existing, known and relevant data**
- **Mathematical analysis of this data leading to a wave shape (field)**
- **Generation of this field**
- **Phase reversal of field (lift)**

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Figure 2) "Steps in Understanding Gravity" is an outline of the tasks taken and the order preformed in doing this study. It was done in two parts as the total package would be too much information to cram into a single presentation.

The "Study of Gravity" (part1) deals with the documentation and math models concluding with a functioning accelerating force (gravity) equation.
1) Research and documentation of existing, known and relevant data about the functioning of the earth system. This systems approach includes the data and analysis of all the major parts, not just of the surface acceleration commonly call "gravity".
2) Mathematical analysis of all this data. Chose MatLab as the number crunching software tool as it includes all the regular math functions, trig functions, matrix operations and high powered ones like curve fitting, imaginary number operations plus Fourier transforms. The goal was to generate a math model that accounted for the total system's operation.

The "Study of Gravity" (part 2) deals with the generation of this wave shape and proposed applications.
3) Generation of this accelerating force (gravity) wave by using regular (EM) ElectroMagnetic field equations. This would correlate the accelerating Force field (F-field) to the Electric field (E-field) and the Magnetic field (B-field) giving equation(s) that could be tested and used. Phase reversal and synchronization of this field should generate a usable lifting force.
4) Proposed applications using this lifting force combined with other current technologies could be applied to space drive engines.

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GRAVITY DOCUMENTATION

What is Known

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Figure 3) "Gravity Documentation" all of the research data for this study was from public domain no Boeing information was used in this presentation the "Study of Gravity". Most of the space data (magnetosphere, geo-sync orbit, radiation belts) is from the NASA website. The earth's structure and core data (mantle, crust, atmosphere, ionosphere) is from various geological websites.

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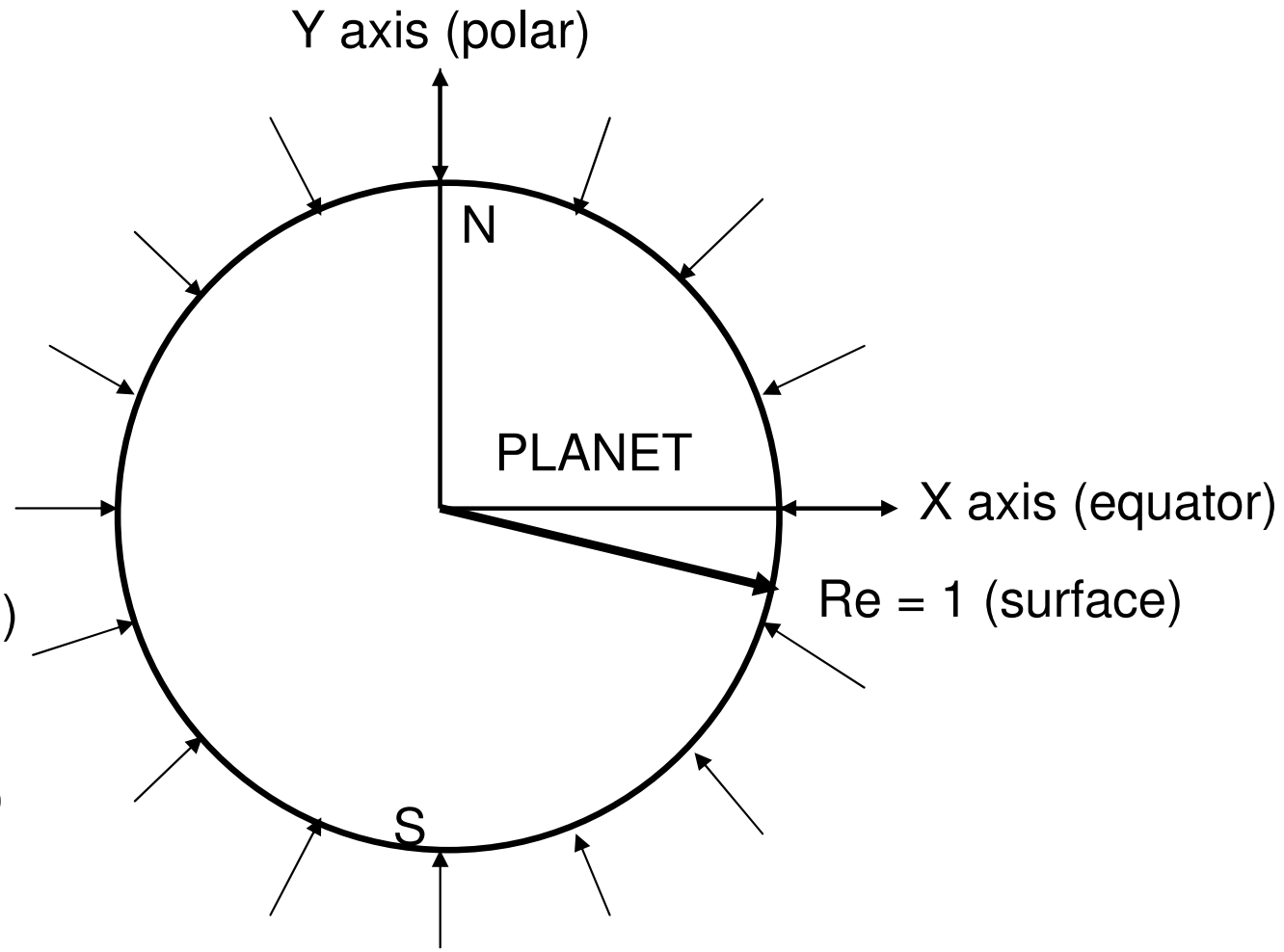
PHYSICS: Gravity

Spherical Field



Re = 1 Earth Radius (surface)
= 3963 Miles

Gav = Gravity Average (radial)
= 32.174 ft/sec2 @ Re=1

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Figure 4) "Physics: Gravity" from the textbook this is the standard classical definition. Starting with the basic definition that gravity is a radial acceleration with an average value of 32ft/sec2 decreasing as the distance squared. It was first discovered by Newton, something about getting hit on the head with an apple.

Main points:
1) The "Equator" direction is defined as the X-axis (+X = radial out)
2) The "Polar" direction is defined as the Y-axis (+Y = north)
3) The (Re) radius of the earth is 3963 miles
4) Average surface value (Re=1) is -32ft/sec2
5) Varies inversely as the distance (radius) squared

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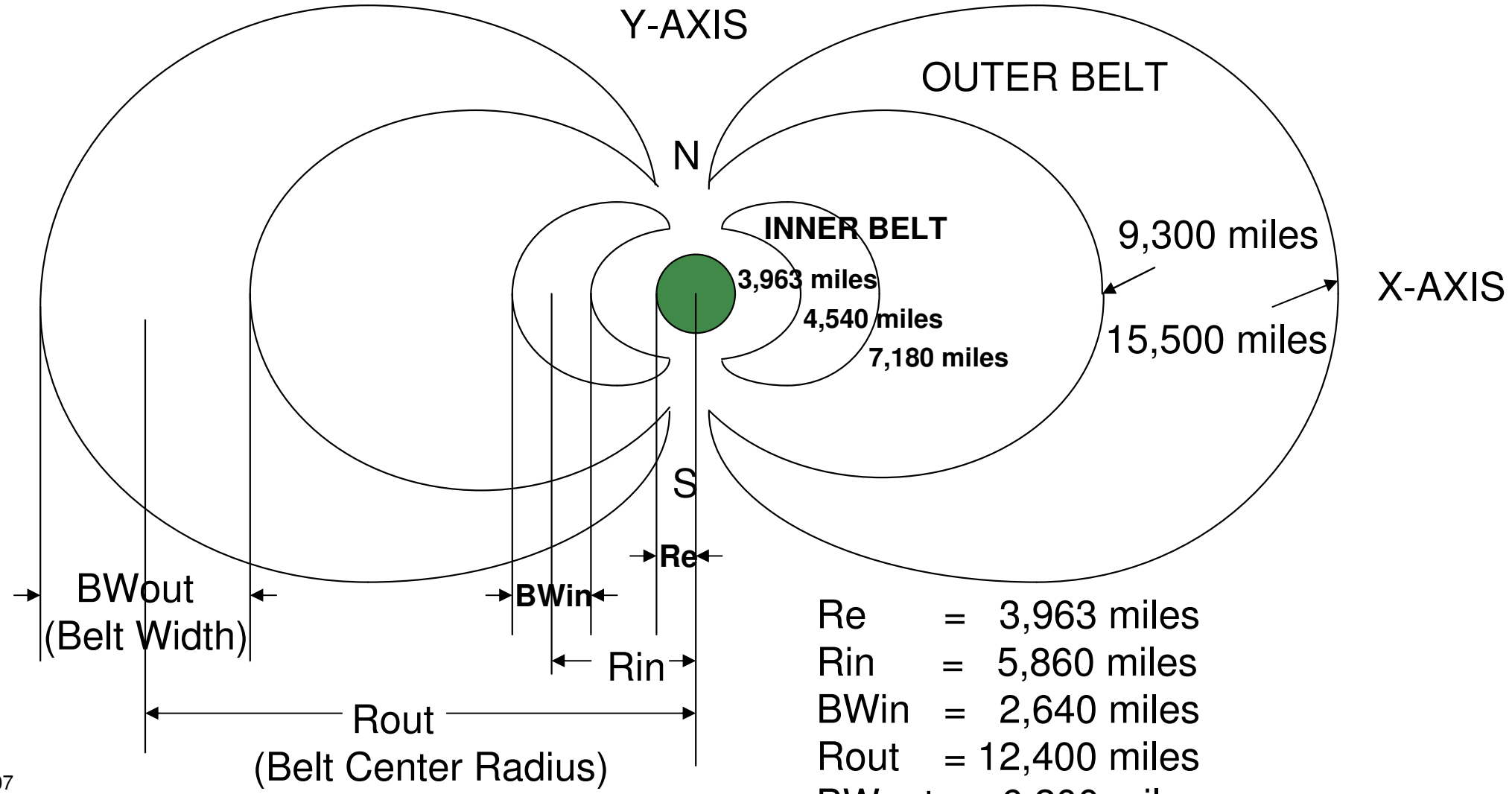
VAN ALLEN RADIATION BELTS

(Donut Shaped Rings)



Re = 3,963 miles
Rin = 5,860 miles
BWin = 2,640 miles
Rout = 12,400 miles
BWout = 6,200 miles

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Figure 5) "Van Allen Radiation Belts" moving further out from the earth's surface is the Van Allen Radiation Belts. These belts are actually two concentric donut shaped rings. Which have a crescent (half moon) shaped cross section when viewed from the side, they are thickest around the equator and taper off to zero at both the poles. The inner belt starts about 500miles above the equator and is about 2,600miles wide. While the outer belt starts about 5,300miles above the equator and is 6,200miles wide.

Main points:
1) The radiation belts are two concentric donut shaped rings above the equator
2) All radius measurements are from the center of the earth
3) The (BW) Belt Width and (R) Radius are both measured at the equator

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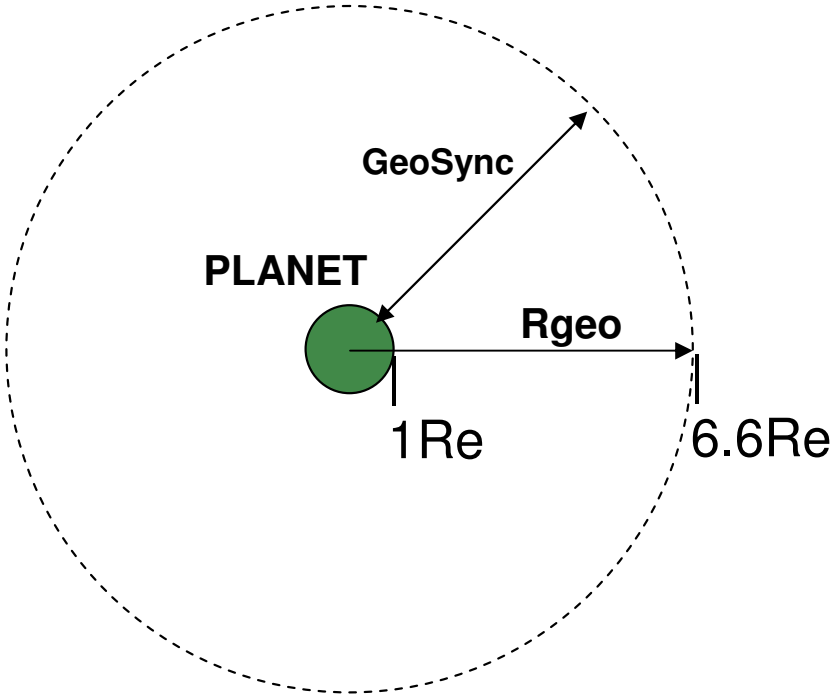
GEOSYNC ORBIT



Rgeo = 26,156 Miles (6.6Re)
Re = 3,963 Miles (1Re)
GeoSync = 22,193 Miles (above surface)

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Figure 6) "GeoSync Orbit" moving further out from the radiation belts is the place known as geosynchronous orbit (GeoSync for short). This place 22,000miles above the equator is where all the communications satellites are "parked". It has the unique feature that satellites at this distance (radius) have an orbital speed that exactly matches the earths rotation so they appear to remain stationary (in one place) with respect to any point on the earth's surface even though they are moving at speeds of thousands of miles per hour.

Main points:
1) The (Rgeo) radius of geosync orbit is 26,000miles (6.6 Re)
2) The (Re) radius of the earth is 3963miles

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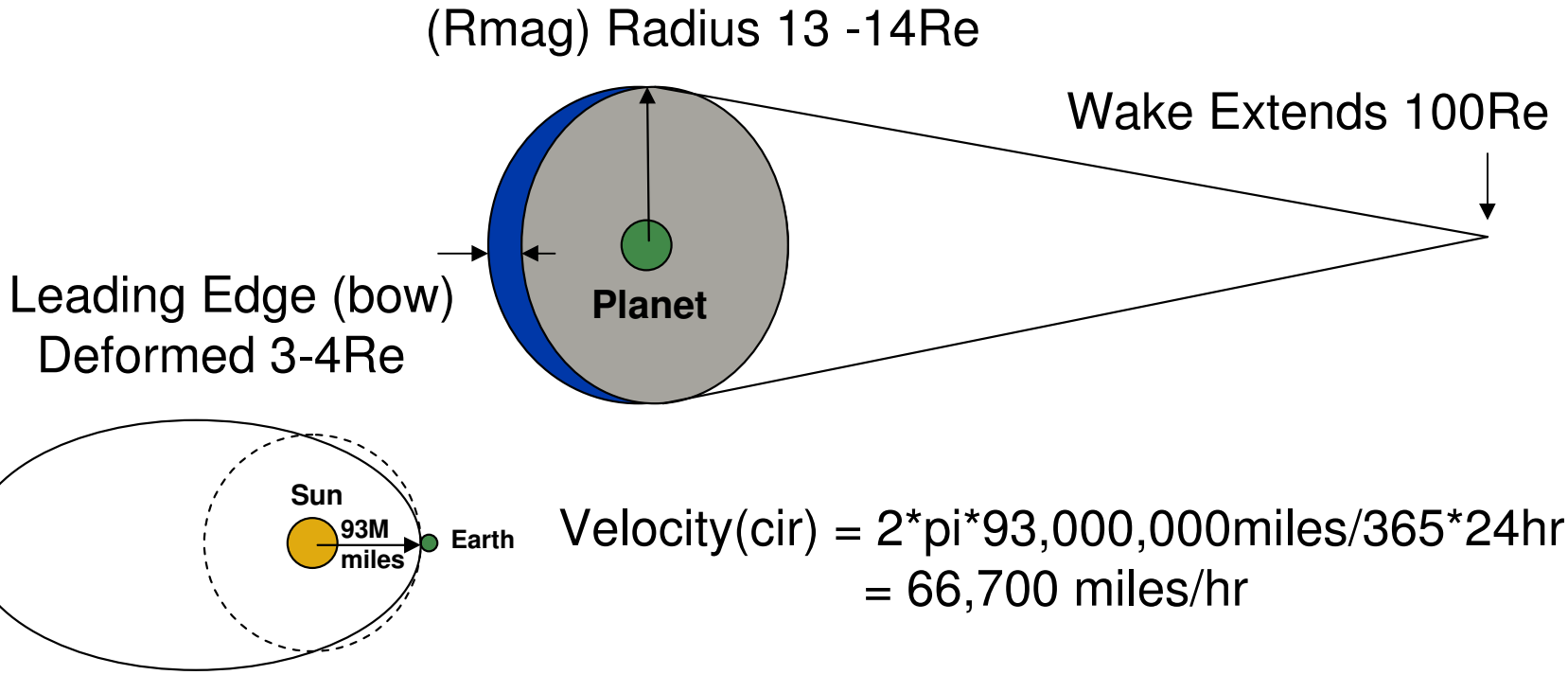
MAGNETOSPHERE



Velocity(cir) = 2*pi*93,000,000miles/365*24hr
= 66,700 miles/hr

1) That's magnetoSPHERE with the accent on "sphere"
2) A circle (sphere) is a poor aerodynamic shape, though "aero" might not be the right word.
3) Wake and bow compression caused by high speed passage through some type of (fluid) media.

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Figure 7) "Magnetosphere" moving much further out from GeoSync orbit is the outer edge of the earth's magnetic shell or magnetosphere. It is located about 52,000miles above the equator. The shell would be a perfect sphere, if not for the fact the earth was traveling at high speed through some type of (fluid) media. Like a boat going through the water the earth has a bow wave and leaves a long wake behind it. However, a boat has a ridged bow structure and the earth does not. Therefore, the front edge of the earth's spherical shell (magnetosphere) is compressed from the impact of this media.

Main points:
1) The magnetosphere has an outer radius (Rmag) of about 52,000 to 56,000miles (13-14Re)
2) The earth is orbiting the sun at about 67,000miles/hr
3) A sphere is a poor aerodynamic shape, though "aero"(air) is not the correct media
4) Front of magnetosphere is compressed 12,000 to 16,000miles (3-4Re)
5) Leaves a long wake of about 400,000miles (100Re)

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GRAVITY ANALYSIS

Number Crunching

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Figure 8) "Gravity Analysis" the number crunching section contains two short tutorials and the main section on waveshape generation followed by a short tutorial on Tesla's work. The first tutorial is on the relevant mathematical equations used in the analysis and the other on wave basics as they apply to this study. The waveshape generation section shows what forces are needed to construct the crescent shaped rings and spherical shells along with their harmonic placements and frequencies.

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Relevant Equations

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Figure 9) "Relevant Equations" is a short tutorial on the mathematical equations used in this study and how they apply to the math modeling.

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PHYSICS: Newton's Law

$$F = M*A$$

Force equals Mass times Acceleration

EQUATION APPLIES:

1) Force is proportional to Acceleration (in the presence of Mass)

2) Mass in a Force field will (try to) Accelerate

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Figure 10) "Physics: Newton's Law" straight from the textbooks states that "Force equals Mass times Acceleration". This equation applies to the analysis in two ways. First, it shows that in the presence of Mass, Force is proportional or equivalent to Acceleration; Mass being the constant of proportionality. And second, if a Mass is placed in a Force field it will (try to) Accelerate unless it can not move (blocked force).

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CALCULUS: Acc/Velocity/Position

$$A = dV/dt = d^2P/d^2t$$

Acceleration equals the derivative of Velocity or the second derivative of Position

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Figure 11) "Calculus: Acc/Velocity/Position" basic calculus shows the correlation between position (p), velocity (v) and acceleration (a). First, Velocity (v) equals the derivative (dp/dt) of position (p). Second, Acceleration (a) equals the derivative (dv/dt) of Velocity (v). Therefore, Acceleration (a) equals the second derivative (d2p/dt2) of position (p).

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PHYSICS: Left Hand Motor Rule

$$F = E \times B$$

Force equals Electric [E] field "[vector] cross product" Magnetic [B] field

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Figure 12) "Physics: Left Hand Motor Rule" shows that the force turning a motor armature is related to the flow of the electric (E) field times the strength of the magnetic (B) field; all fields being orthogonal (90deg) to each other. This is only an empirical equation showing the general relationship of all the fields as it needs correct constants added to be exact.

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Wave Basics

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Figure 13) "Wave Basics" is a short tutorial on waves in general starting with the basic definitions and common names. It is background material for understanding the acceleration waves and their analysis.

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Waves in General

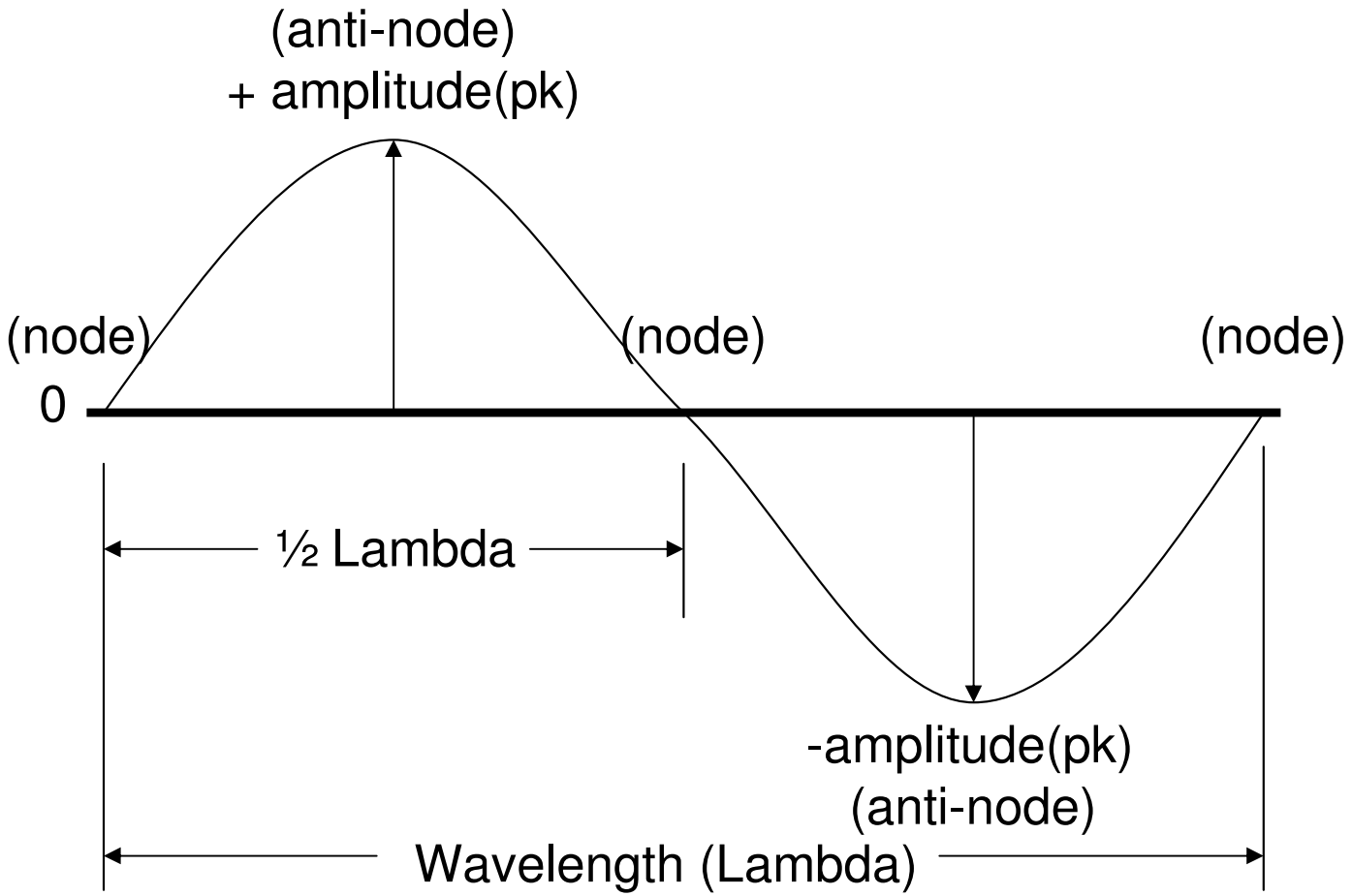

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Figure 14) "Waves in General" shows one cycle of a basic wave and describes and defines its makeup. Nodes are the zero crossings or transition points of the wave. The peaks or anti-nodes are the maximum and minimum wave values. The unit of length for one cycle of a wave is called wavelength (λ = Lambda).

Main points:

1) Wave nodes
2) Wave amplitude and peaks
3) Wavelength (λ)

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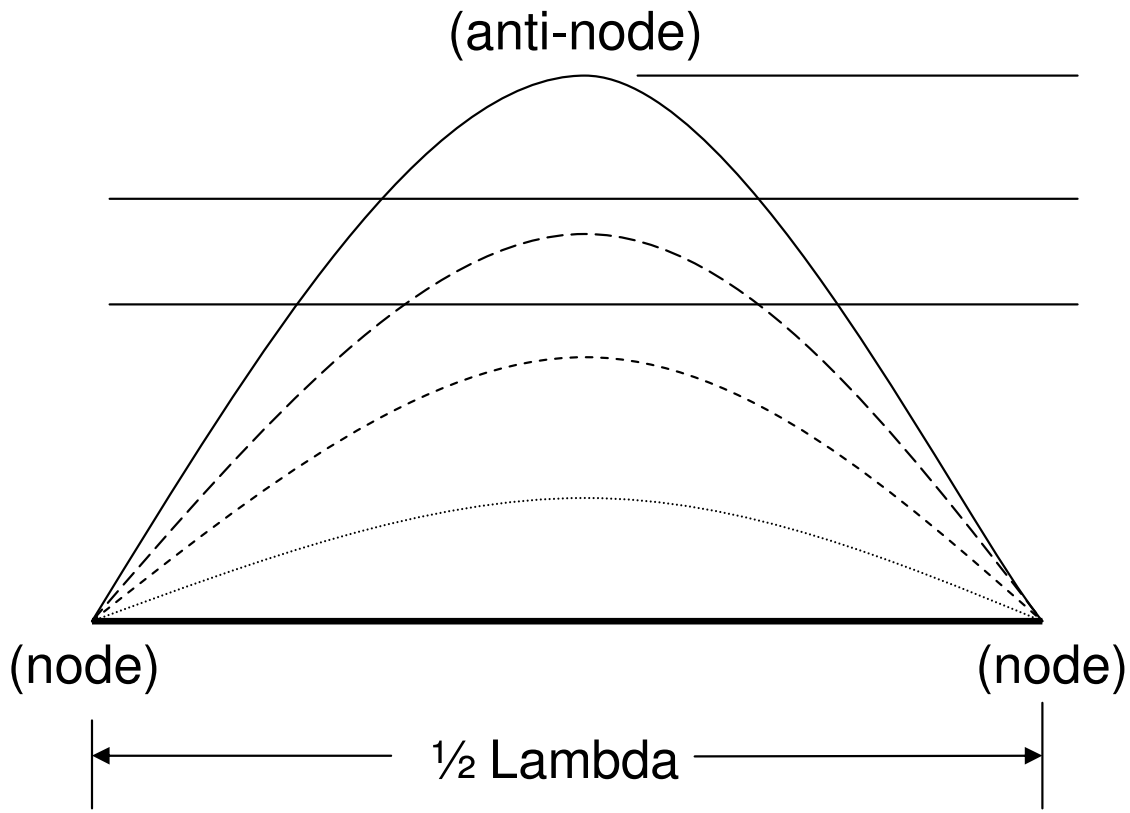
Wave Amplitude



Gav = Average Gravity
= 32.174 ft/sec2 @ Re=1

Gpk = Peak Gravity

Therefore: Gpk = Gav / .637
= 32.174 / .637
= 50.509 ft/sec2 / 5280 ft
= .01 miles/sec2 @ Re=1

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Figure 15) "Wave Amplitude" defines the three ways of measuring a wave's amplitude and shows the correlation between them. First, is the maximum or peak (pk) value defined as 100%. Second, is the (RMS) Root Mean Squared value of 0.707pk defined as 70.7%. And third, the average or DC value of 0.637pk defined as 63.7%. Using these standard values for conversion, the average value of the acceleration of gravity (-32.174ft/sec2 @ Re=1) can be converted to its peak value (-0.01miles/sec2) for the analysis. The units of "feet" were also converted to "miles" as the math modeling was done in those units.

Main points:

1) Three types of wave amplitude measurement
2) Conversion of the acceleration of gravity to its peak value

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STANDING WAVES

Two waves of equal amplitude traveling in opposite directions generate a standing wave of double amplitude

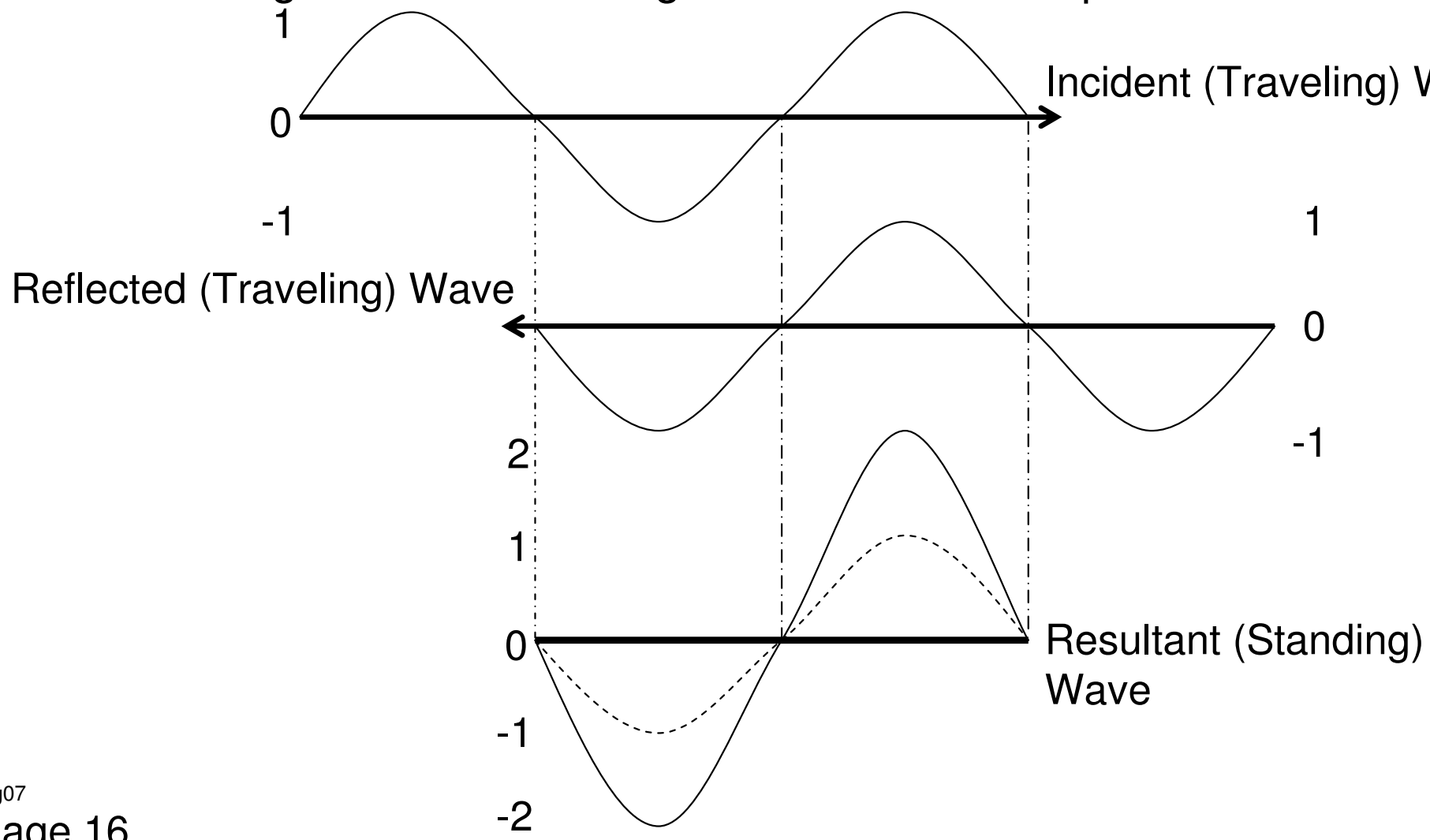

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Figure 16) "Standing Waves" shows how a standing wave is generated. Waves are either traveling (moving) or standing (stationary). When a transmitted wave called an "incident" wave is reflected back totally or partially these two (incident/reflected) traveling waves each going in opposite directions combine (mix) to produce a resultant wave that is stationary and only varies in amplitude. This basic textbook definition holds only if the phase and frequency of the wave was not changed much in the reflection. Real world wave analysis must account for these changes as they appear as distortion and polarization in the results.

Main points:

1) Two types of waves: traveling and standing
2) The standing wave has double (2x) the traveling wave's amplitude

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POLARIZED (rectified) WAVE

Fundamental plus second harmonic (half amplitude) results in a nonsymmetrical (polarized) wave

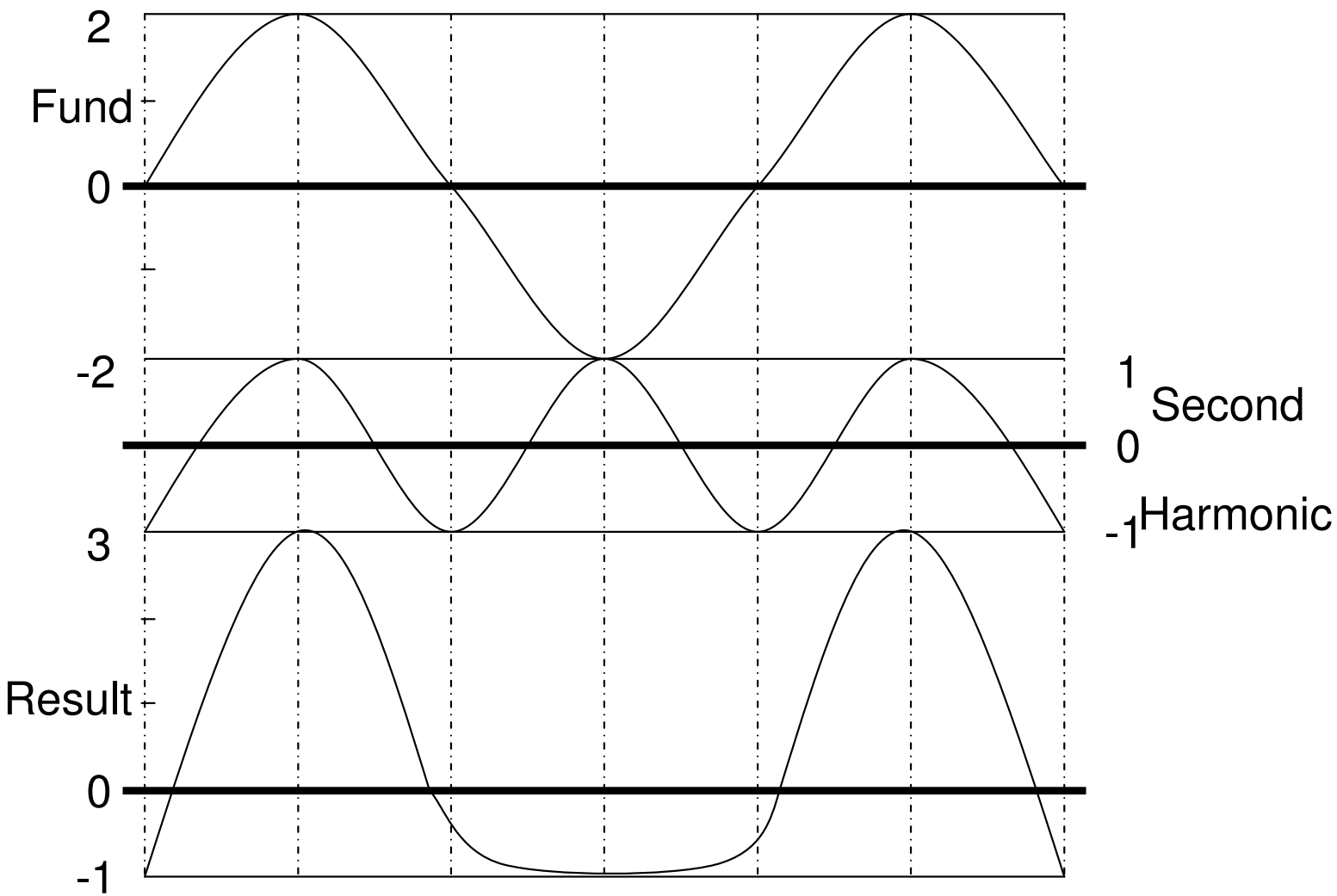

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Figure 17) "Polarized (rectified) Wave" if the reflected waves amplitude is halved and its frequency is doubled from that of the incident wave then the resultant standing wave will be what is called polarized. This waveshape is not symmetrical (same amplitude) above and below the zero point, it is pushed off to one side or the other. Usually it is caused by some phase shifting between the two traveling waves. However, it can be beneficial if DC rectification is wanted.

Main points:

1) Caused by a change in a waves: amplitude, frequency and phase
2) Generates DC wave rectification

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Wave Shape Generation

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Figure 18) "Wave Shape Generation" This is the main section of the presentation and gives the details about how the different shapes and structures are constructed. Proceeding with the wave harmonics and placements needed to build them.

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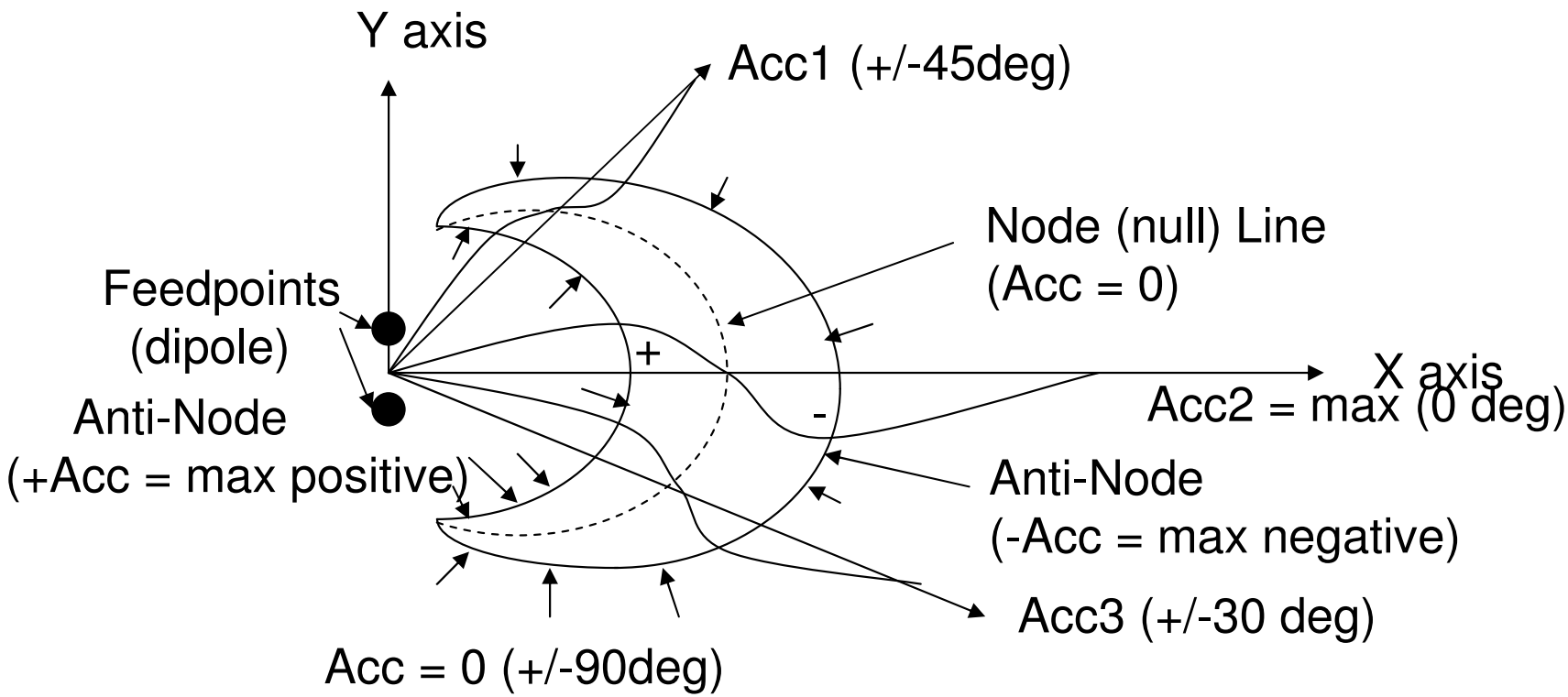
Wave Shape (field) Analysis
[donut shaped ring]



1) Angles and amplitudes of (radial) Acceleration needed to generate the wave shape (+Acc = outwards, -Acc = inwards)
2) The 3D wave shape (donut) is generated by two (2) feedpoints centered at the origin (0,0) ½ Lambda apart (dipole) on the Y-axis

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Figure 19) "Wave Shape (field) Analysis (donut shaped ring)" to generate a crescent shaped donut ring field pattern requires an acceleration wave beat frequency from two different sources (dipole feedpoints). To place the acceleration maximum on the X-axis (equator) requires the dipole to be located on the Y-axis (polar) as the feedpoints are orthogonal (90deg) to the point of maximum field strength. A dipole feedpoint spacing of half lambda ($\lambda/2$) is required at the proper frequency. Pattern size is determined by the wavelength (inverse of frequency). This placement generates a circular field pattern with a crescent shaped cross section having a maximum field on the X-axis tapering to zero (no field) on the Y-axis. The cross sectional area of this pattern has a node (zero point) in the middle of the field pattern which is bounded by a plus (+Acc) maximum amplitude on the inner radius and a negative (-Acc) maximum amplitude on the outer radius producing an "S" shaped pattern in the acceleration wave.

Main points:

1) A crescent shaped ring pattern can be generated by a dipole sourced field pattern
2) Dipole wavelength is $\lambda/2$ which centered at the origin (0,0) on the Y-axis
3) Wavelength determines the pattern size

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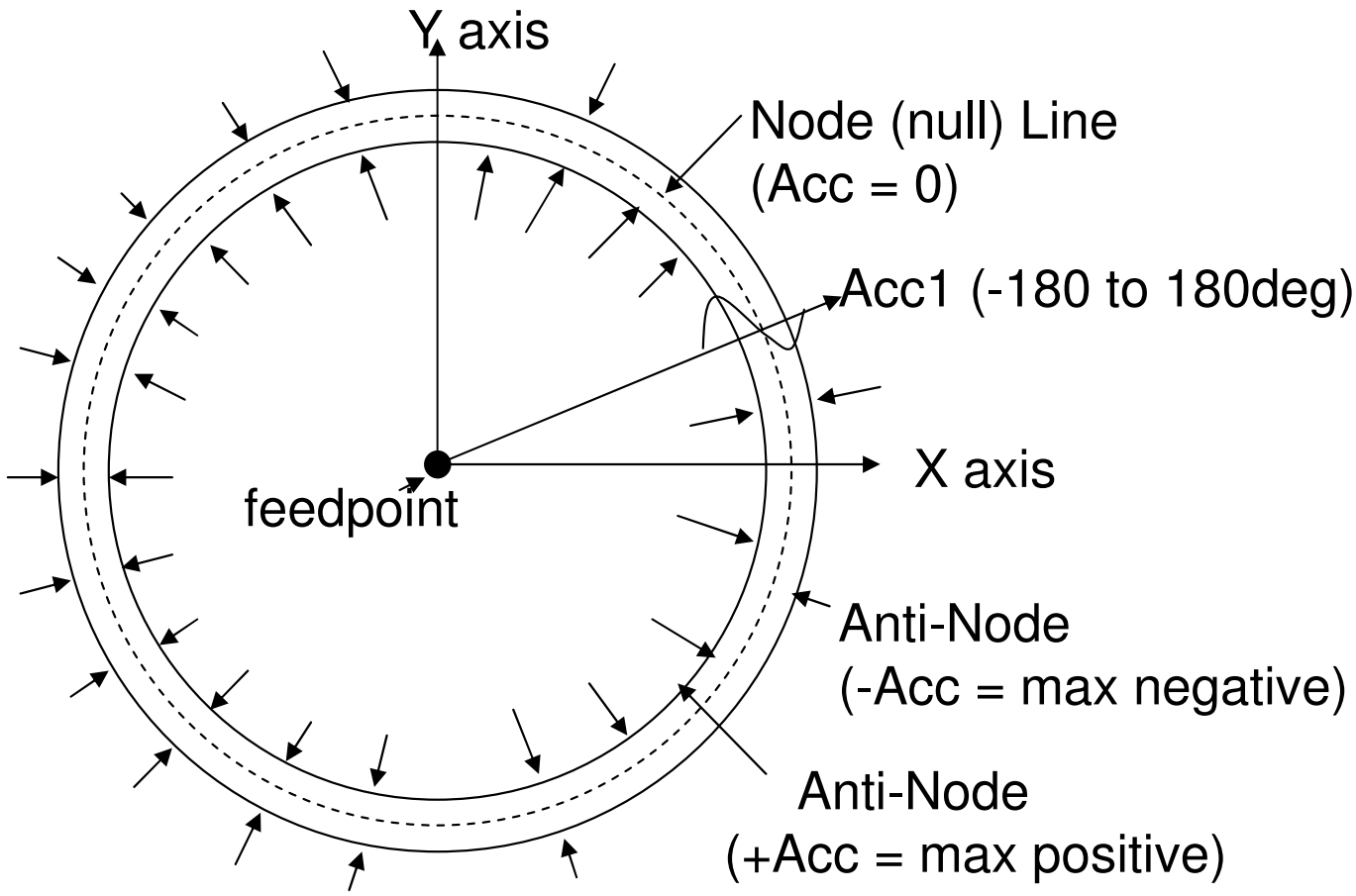
Wave Shape (field) Analysis
[Spherical shell]



1) Angles and amplitude of radial Acceleration needed to generate the wave shape (+Acc = outwards, -Acc = inwards)
2) The 3D wave shape (shell) is generated by one (1) feedpoint centered at the origin (0,0)

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Figure 20) "Wave Shape (field) Analysis (spherical shell)" to generate a spherical shell field pattern requires an acceleration wave from only one source (feedpoint) located at its center (0, 0). Pattern size is determined by the wavelength (inverse of frequency). This placement generates a circular shell field pattern with equal maximums on both the X-axis and Y-axis. The cross sectional area of this pattern has a node (zero point) in the middle of the field pattern which is bounded by a plus (+Acc) maximum amplitude on the inner radius and a negative (-Acc) maximum amplitude on the outer radius producing an "S" shaped pattern in the acceleration wave.

Main points:

1) A spherical shell pattern can be generated by a single sourced field pattern
2) Feedpoint is centered at the origin (0,0) on the Y-axis
3) Wavelength determines the pattern size

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Wavelengths (Lambda)

Radius(R) = Lambda / 2*pi
Rgeo = Lambda
Rmag = 2*Lambda

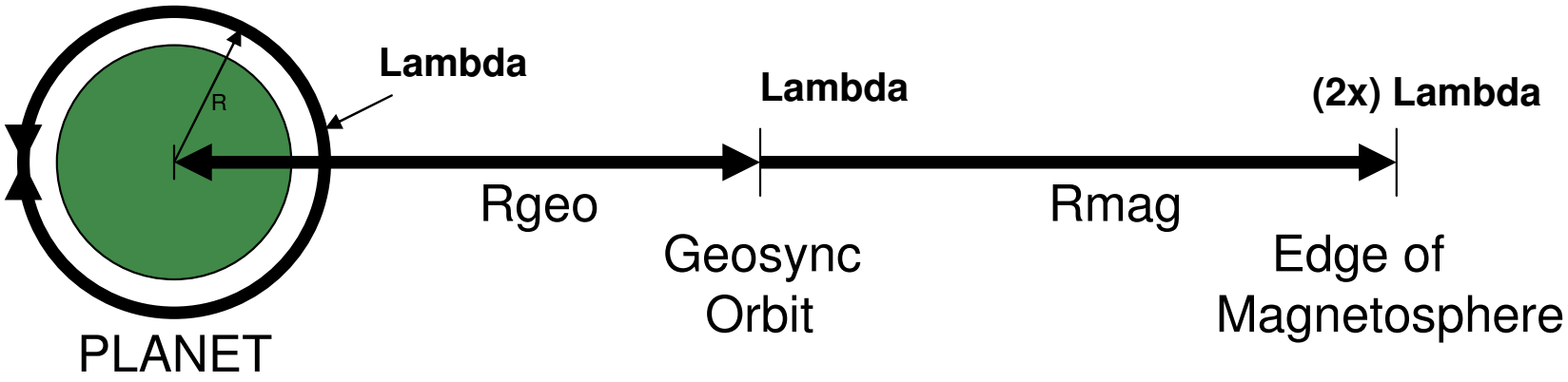

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Figure 21) "Wavelengths (lambda)" shows the major harmonic spacing between the earth's center out to GeoSync orbit and further out to the edge of the magnetosphere. Also, shown is the harmonic distance of the earth's circumference. All distances are measured in wavelengths (λ). The radius (Rgeo) of geosync orbit is λ as is the outer circumference of the earth. However, the radius (Rmag) of the magnetosphere edge is double that 2λ.

Main points:

1) Outer circumference of the earth is lambda (λ)
2) Radius of geosync orbit is lambda (λ)
3) Radius of the magnetosphere edge is 2 lambda (2λ)

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RADIUS ESTIMATES

Planet Structure

Radius(R) = 4194Miles (minimum)
Rair = 4013Miles (air)
Re = 3963Miles (surface)

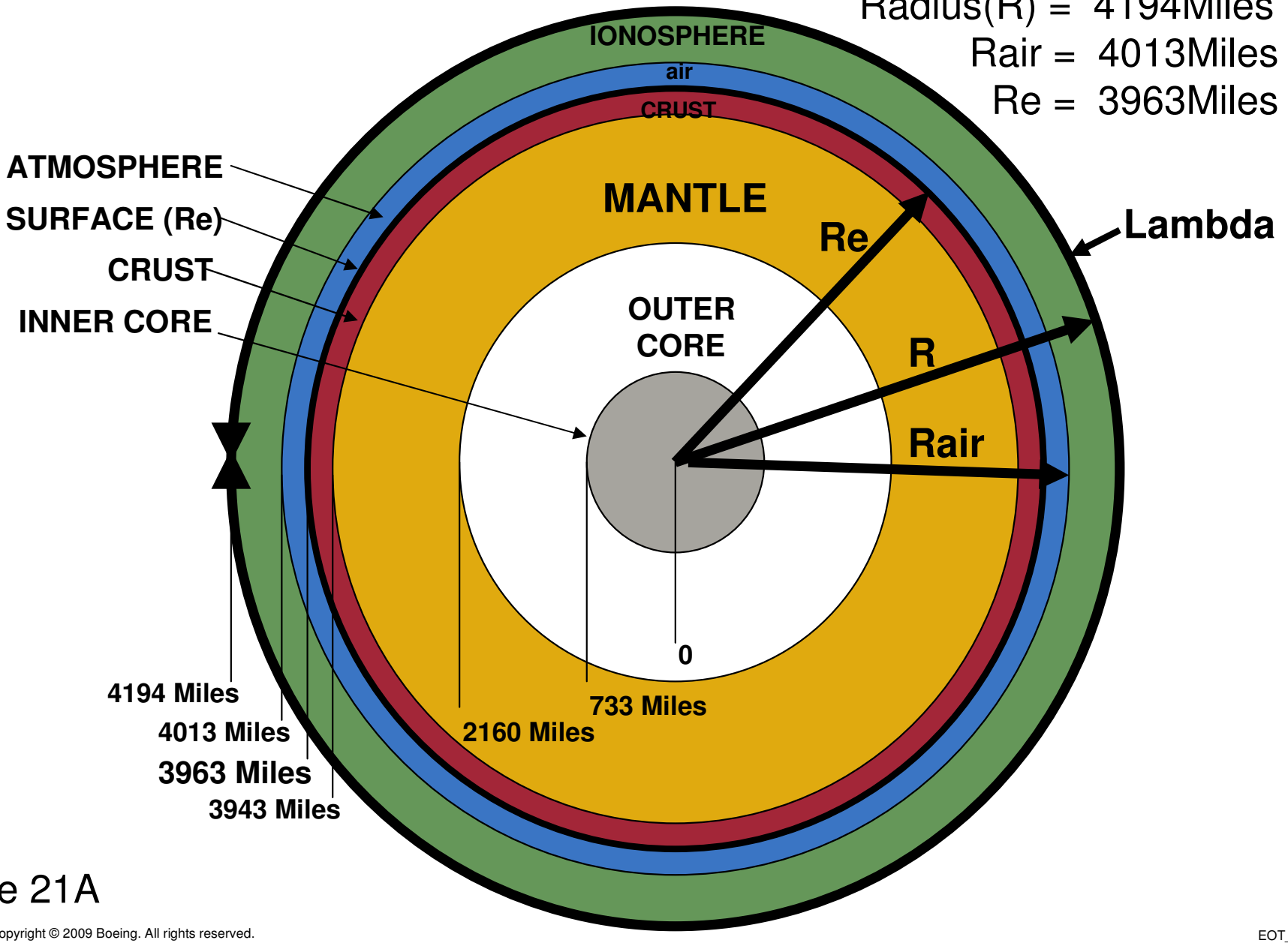

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Figure 21A) "Radius Estimates (planet structure)" is a more detailed view of figure 21 showing just the earth harmonics. It show the earth's circumference wave (λ) completely enclosing the ionosphere and the rest of the planet's structure. The radius (R) to the edge of the ionosphere extends about 230miles above the surface while the radius (Rair) to the edge of the atmosphere only extends about 50miles above the surface of the planet.

Main points:

1) Radius (R) of the ionosphere is 4194miles
2) Radius (Rair) of the atmosphere is 4013miles
3) Radius (Re) of the earths surface is 3963miles
4) All distances are measured from the earth's center

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GRAVITY FREQUENCIES
(ESTIMATES)

GeoSync (Rgeo)

Freq = C / Lambda Lambda = 6.6*3963(miles)
= 186,284(miles/sec) / 26,156(miles)
= 7.12Hz

Earth Radius (Re)

Freq = C / Lambda Lambda = 2*pi*4194(miles)
= 186,284(miles/sec) / 26,352(miles)
= 7.07Hz(max)

Using: Fundamental Frequency 7.1Hz
Second Harmonic 14.2Hz
Third Harmonic 21.3Hz
Fourth Harmonic 28.4Hz

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Figure 22) "Gravity Frequencies (estimates)" shows two different ways of estimating the frequency of the acceleration (gravity) waves using the classical equation (Freq = C / λ). Which states that Frequency is equal to the speed of light (C) divided by the wavelength (λ). First method uses the GeoSync orbit wavelength distance (Rgeo) in the calculation giving an answer of 7.12Hz. Second method used the earth's radius (Re) in the calculation giving an answer of 7.07Hz. Taking the mathematical average of these two numbers and rounding the answer gives the initial estimate of 7.1Hz for the fundamental frequency. The second harmonic 14.2Hz is two times (2x) the fundamental, the third harmonic 21.3Hz is three times (3x) the fundamental and the fourth harmonic 28.4Hz is four times (4x) the fundamental.

Main points:

1) Wavelength to frequency conversion equation (Freq = C / λ)
2) Two different methods used to calculate the frequency
3) Acceleration (gravity) wave frequency estimates are: 7.1Hz, 14.2Hz, 21.3Hz, 28.4Hz

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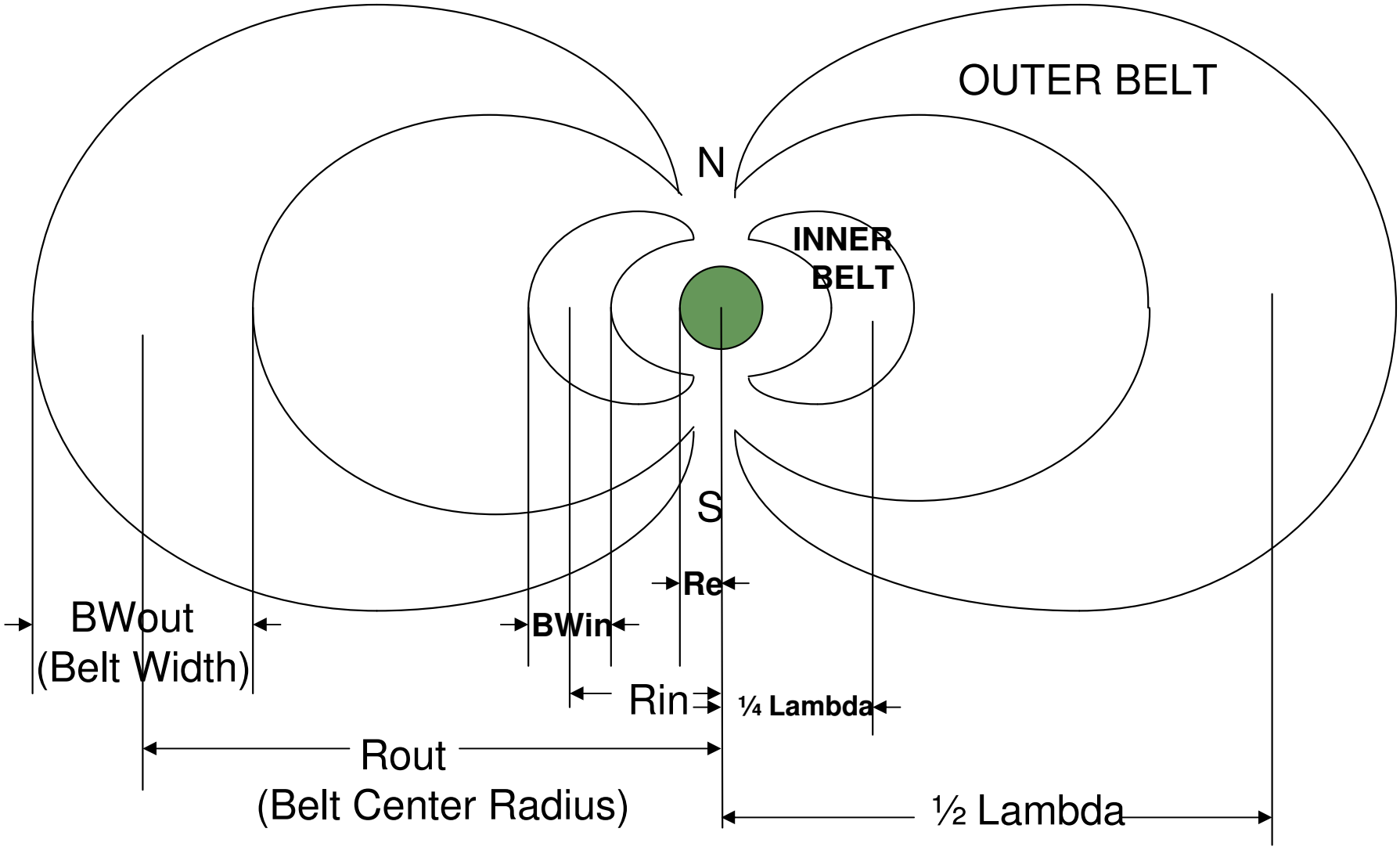
RADIATION BELTS



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Rin = ¼ Lambda Rout = ½ Lambda

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Figure 23) " Radiation Belts" is the same data as figure 5 "Van Allen Radiation Belts" only the distance measurements (miles) are converted to harmonic wavelengths (λ). The distance from the center of the inner radiation belt (Rin) to the center of the earth is λ/4. The distance from the center of the outer radiation belt (Rout) to the center of the earth is λ/2. All measurements are taken on the X-axis (equator).

Main points:

1) Inner belt radius (Rin) is λ/4
2) Outer belt radius (Rout) is λ/2

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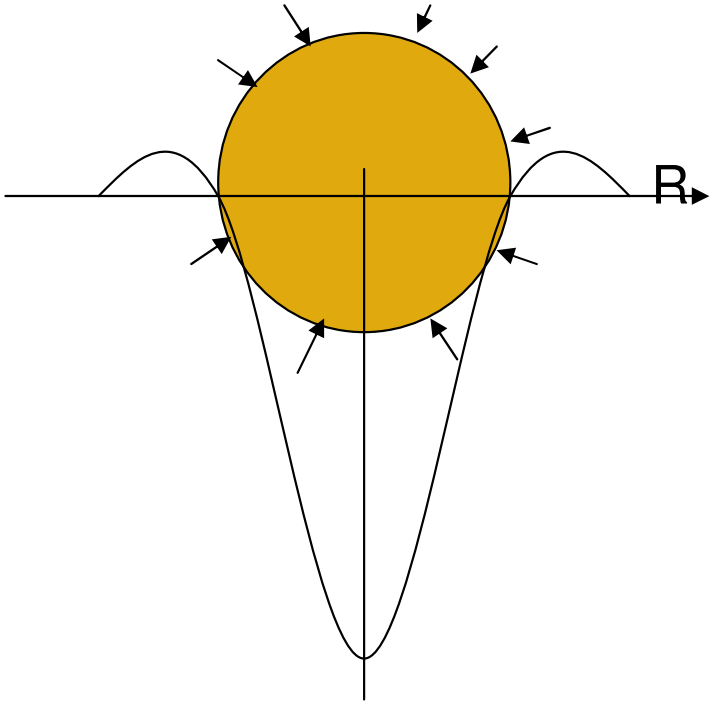
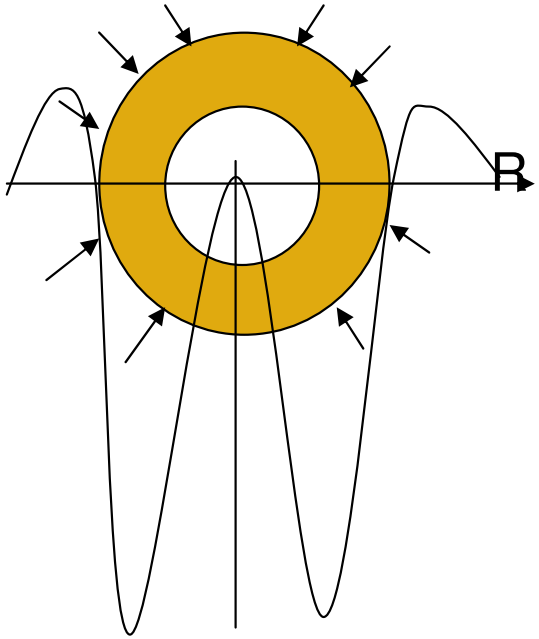
Planet Core Types

Solid



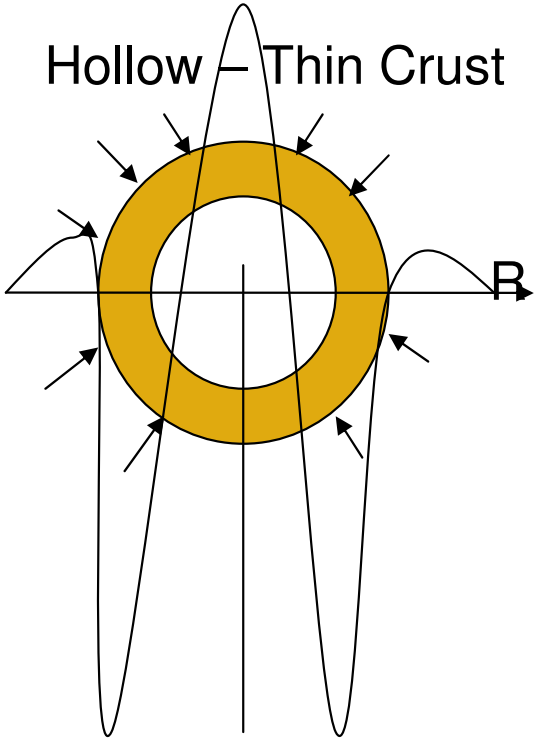
Acc is negative @ R=0

Hollow – Thick Crust



Acc is 0 @ R=0

Hollow – Thin Crust



Acc is positive @ R=0

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Figure 24) "Planet Core Types" shows the three possible types of planet core data. Depending on what the value of the acceleration (gravity) wave is at the center of the earth (R = 0) the structure would be a solid if the wave had a negative value or it would be hollow with a thick crust if the wave was zero or it would be hollow with a thin crust if the wave had a positive value. The higher the value of positive acceleration the thinner the crust gets. We are not talking pizzas here, we are talking solid rock! The pictures show the acceleration wave patterns and the resulting structural shapes.

Main points:

1) Planet core structure depends on the acceleration waveshape at (R = 0)
2) Three possible types (solid, hollow-thick crust, hollow-thin crust)

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Proposed Y-Axis Data Plots

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Figure 25) "Proposed Y-axis Data Plots" the next step in the analysis process is to collect and put together all the previous individual pieces of data that are relevant for the Y-axis (polar) waveshape analysis.

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Proposed (Radial) Wave Shape(s)

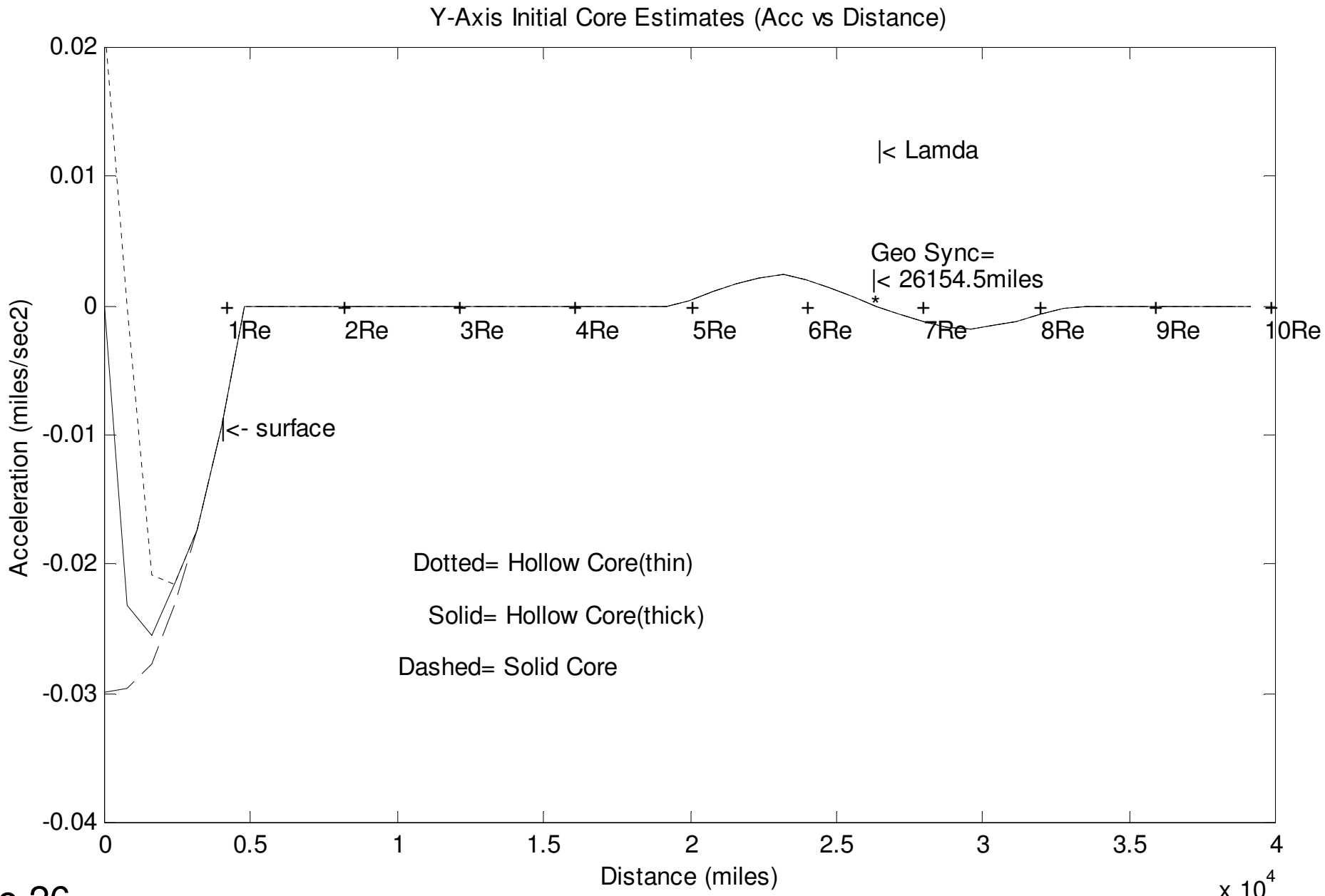

Figure 26) "Proposed (radial) Wave Shapes" this plot shows what the proposed Y-axis (polar) waveshape would be to generate the given field patterns. The composite waveshape shows the three different core types at (R = 0) and the earths surface acceleration value of -0.01miles/sec2 at (R = Re). Also, shown is the "S" shaped wave pattern (shell) at GeoSync (R = λ) and another smaller "S" shaped wave pattern out at the magnetosphere edge (R = 2λ) but due to MatLab plotting software's scaling issue it is off page at 50,000miles. Distances are shown in harmonic wavelengths (λ), earth radius (Re) and miles. Note there are three separate composite waveshapes one generated for each core type all superimposed on this plot.

Main points:

1) Displays waveshapes for all three core types
2) Displays earth's surface marker
3) Displays GeoSync orbit marker
4) Three types of distance measurements

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FFT of Proposed Wave Shape(s)

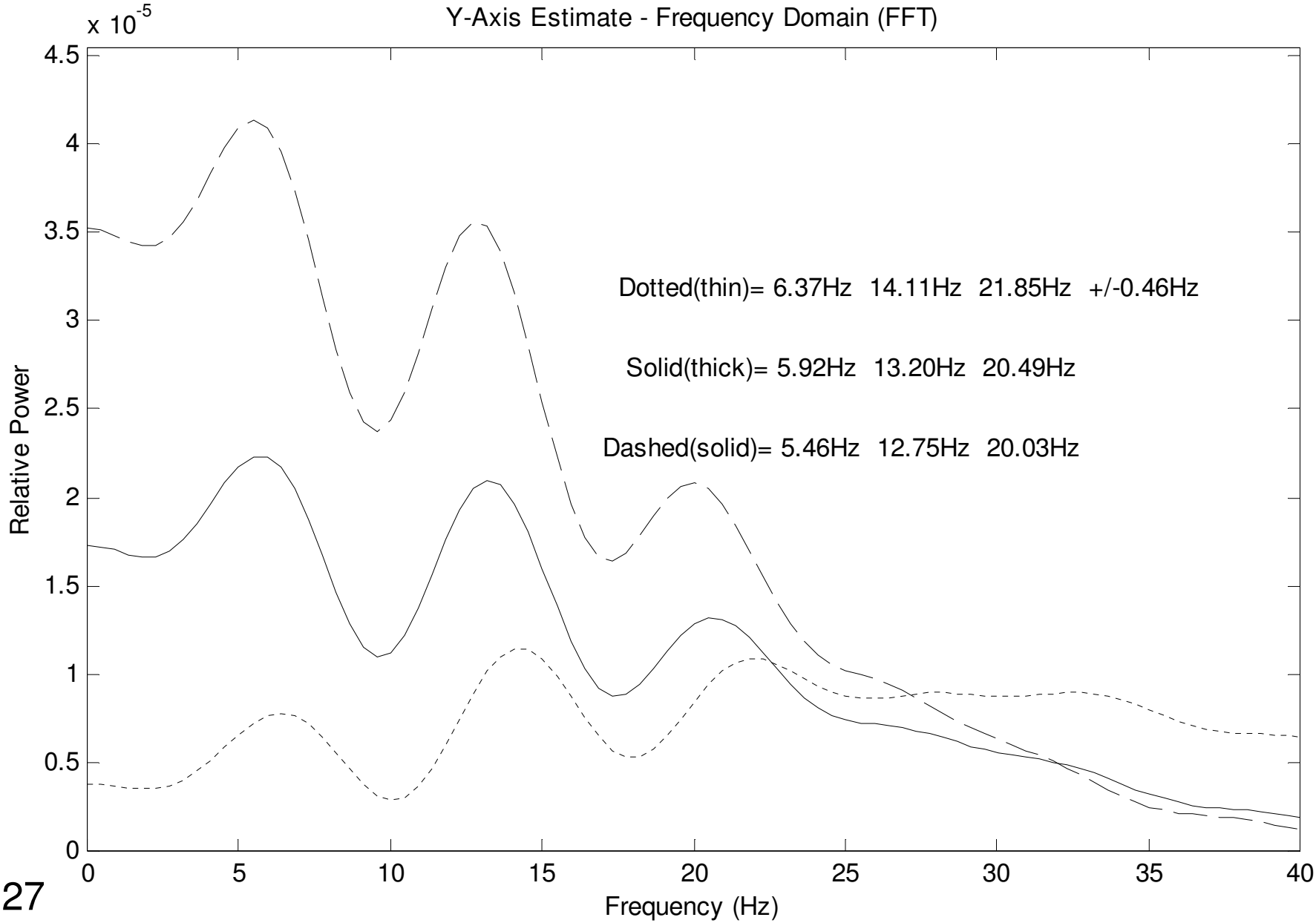

Figure 27) "FFT of Proposed Wave Shapes" gives the (FFT) Fast Fourier Transform for the three different core types in the Y-axis (polar); the composite waveshapes are displayed in the frequency domain. As can be seen from the plots all three core waveshapes are composed of approximately the same three harmonics (6Hz, 13Hz, 20Hz). The main differences are in wave amplitude and phasing. Looking a little closer only two of the waves (solid core, hollow – thick crust) are decreasing in amplitude with increasing frequency. Note a Fourier transform is a mathematical operation that outputs the harmonic frequency content of a given input waveshape.

Main points:

1) Valid FFT waveshape no discontinuities
2) All three waveshapes are composed of the same three harmonics
3) Only the solid core and hollow core – thick crust waveshapes have decreasing amplitude

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Proposed X-Axis Data Plots

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Figure 28) “Proposed X-axis Data Plots” the following plots collect and put together all the previous individual pieces of data that are relevant for the X-axis (equator) waveshape analysis.

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Proposed (Radial) Wave Shape(s)

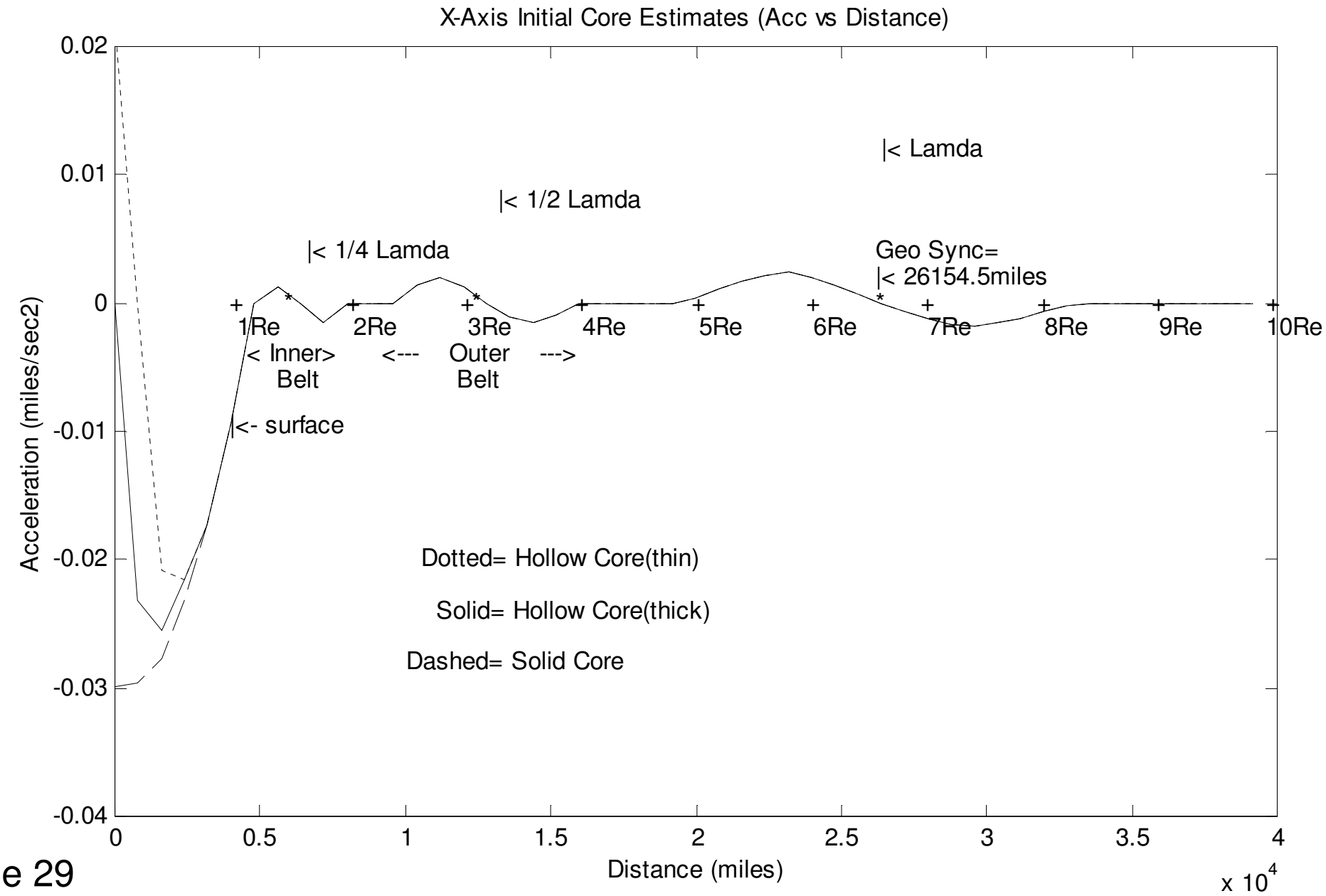

Figure 29) "Proposed (radial) Wave Shapes" plot shows what the proposed X-axis (equator) waveshape would be to generate the given field patterns. The composite waveshape shows the three different core types at (R = 0) and the earths surface acceleration value of -0.01miles/sec2 at (R = Re). Also, shown is the "S" shaped wave pattern (shell) at GeoSync (R = λ) and another smaller "S" shaped wave pattern out at the magnetosphere edge (R = 2λ) but due to MatLab plotting software's scaling issue it is off page at 50,000miles. Plot is similar to Figure 26) for the Y-axis data but with additional data included for the inner belt located at (R = λ/4) and outer belt located at (R = λ/2). Distances are shown in harmonic wavelengths (λ), earth radius (Re) and miles. Note there are three separate composite waveshapes one generated for each core type all superimposed on this plot.

Main points:

1) Displays waveshapes for all three core types
2) Displays earth's surface marker
3) Displays Inner and Outer belt markers
4) Displays GeoSync orbit marker
5) Three types of distance measurements

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FFT of Proposed Wave Shape(s)

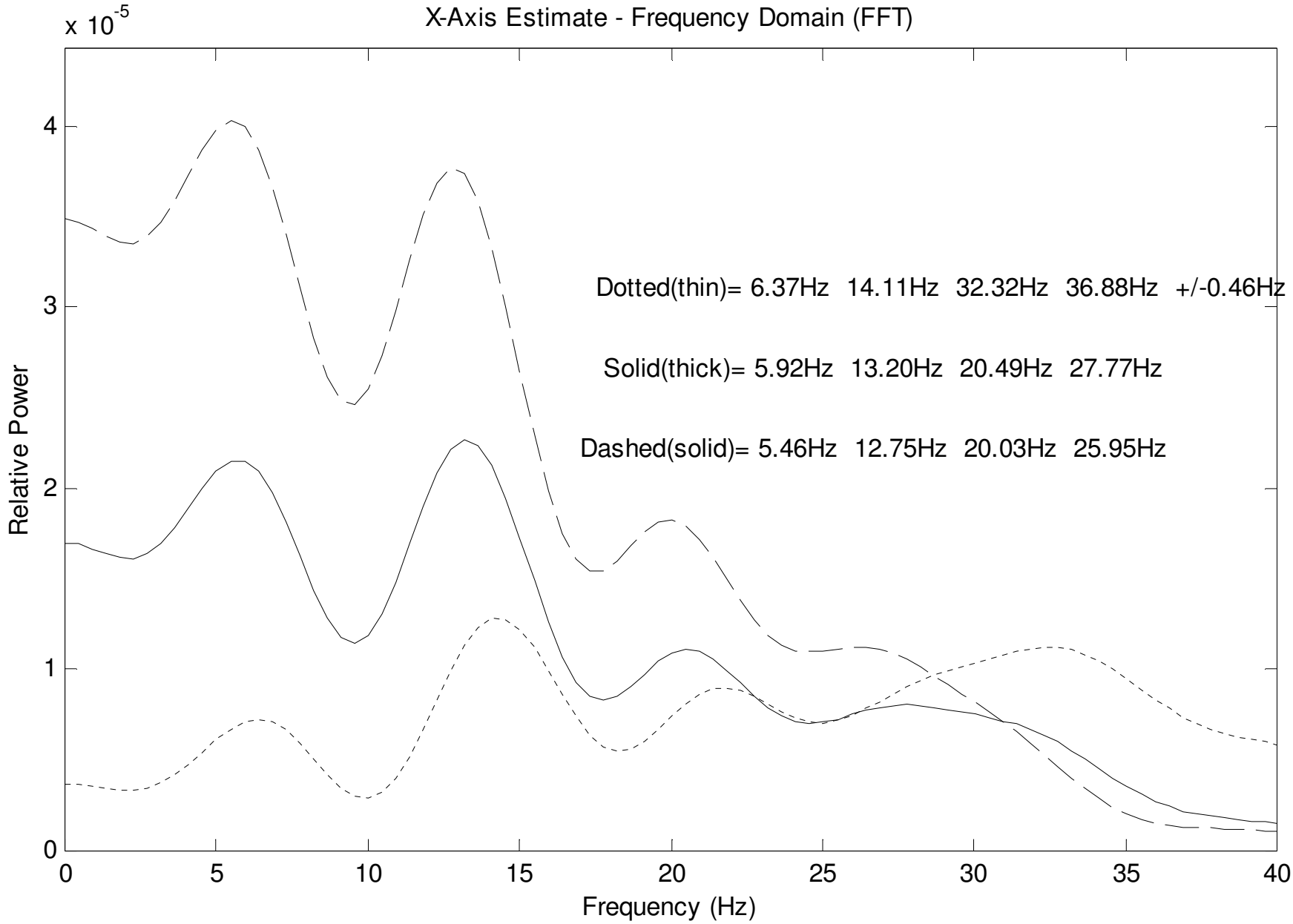

Figure 30) "FFT of Proposed Wave Shapes" gives the (FFT) Fast Fourier Transform for the three different core types in the X-axis (equator); the composite waveshapes are displayed in the frequency domain. As can be seen from the plots all three core waveshapes are composed of the same three harmonics (6Hz, 13Hz, 20Hz) as the Y-axis data but with the addition of a fourth higher harmonic. The main differences are in wave amplitude and phasing. Looking a little closer the same two waves (solid core, hollow – thick crust) are decreasing in amplitude with increasing frequency.

Main points:

1) Valid FFT waveshape no discontinuities
2) All three waveshapes are composed of the four harmonics
3) The radiation belts add an additional harmonic to the three harmonics of the Y-axis data
4) Only the solid core and hollow core – thick crust waveshapes are decreasing in amplitude

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Fast Fourier Transform (FFT)
Erratas

- **Does not give phase or sign data**
- **Gives only relative freq. components**
  - **Freq. bin width resolution (quantization error)**
  - **Freq. shifts due to harmonic(s) phasing**
- **Gives only relative freq. amplitudes**
  - **Harmonic(s) phase and attenuation dependent**

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Figure 31) "Fast Fourier Transform (FFT) errata's" like many other things it is not a perfect mathematical operation some data is lost in the process. First, the transform assumes all the harmonic components have the same phase therefore all phase data is lost. Second, the amplitude data is only relative to the different harmonics so the absolute amplitude value is also lost. However, even with these problems an FFT does a good job of showing the waveshape's sub-harmonic components.

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Proposed Wave Shape(s)
FFT Analysis

- **Y-axis wave shapes generated by THREE harmonics,**
  X-axis wave shapes use FOUR harmonics
  - **Hollow Core(thin)**
  - **Hollow Core(thick)**
  - **Solid Core**
- **Frequencies are CLOSE to the estimated numbers**

CORE TYPE

- **est. solid thick thin**
- **7.1Hz (5.46, 5.92, 6.37Hz +/- .5Hz)**
- **14.2Hz (12.75, 13.66, 14.11Hz +/- .5Hz)**
- **21.3Hz (20.03, 20.94, 21.85Hz +/- .5Hz)**
- **28.4Hz (25.95, 27.77, 36.88Hz +/- .5Hz)**

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Figure 32) "Proposed Wave Shapes FFT Analysis" this figure correlates and summarizes all the proposed X-axis and Y-axis data. FFT analysis of the Y-axis waveshape shows it can be generated by using a fundamental frequency along with the second and third harmonics. Further data reduction shows the X-axis waveshape is generated by the same three harmonics with the additional fourth harmonic. The fourth harmonic mainly appears to generate the crescent shaped inner and outer radiation belts. The FFT of the generated frequencies is close to the original estimated ones for all three core types. As the proposed numbers show good correlation in the first round of analysis there is a high degree of confidence in the original design assumptions.

Main points:

1) Y-axis waveshape generated by three harmonics
2) X-axis waveshape generated by four harmonics
3) Fourth harmonic generates the radiation belts
4) FFT generated frequencies close to the estimated ones

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Wave Shape Generation
Given

Four frequencies:

First (fundamental)	7.1Hz
Second	14.2Hz
Third	21.3Hz
Fourth	28.4Hz

Four phases:

0 deg (sin)
90 deg (cos)
180 deg (-sin)
270 deg (-cos)

Equation

Acc = A*sin(7.1Hz) +B*sin(14.2Hz) +C*sin(21.3Hz) +D*sin(28.4Hz)

cos	cos	cos	cos
-sin	-sin	-sin	-sin
-cos	-cos	-cos	-cos
[phase / freq]	[phase / freq]	[phase / freq]	[phase / freq]

Yields 64 possible combinations [phase / freq]

- Hollow (thick crust) – five (5) combinations (Acc=0 @ R=0)
- Hollow (thin crust) – six (6) combinations (Acc=+ @ R=0)
- Solid – seven (7) combinations (Acc= - @ R=0)
- Random – other 46 combinations

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Figure 33) "Wave Shape Generation (given)" The next step of the analysis is to construct a working equation that will produce or calculate the original proposed waveshape. Based on all the reduced data this equation will have four harmonic frequency terms. The frequencies being a 7.1Hz fundamental , a 14.2Hz second harmonic, a 21.3Hz third harmonic and a 28.4Hz fourth harmonic. As the FFT does not give wave amplitude or phase data these must be determined empirically by comparing the calculated waveshape back to the proposed one. Assume the equation to have the form: Acc = Amplitude*sin(freq+phase). The phasing would need testing in each of the four quadrants: 0deg, 90deg, 180deg and 270deg. Therefore the solution (4x4) matrix would contain four frequencies and four phases producing 64 possible frequency/phase terms. The conclusion after running all 64 possibilities is as follows: five (5) combinations produced a hollow core – thick crust, six (6) combinations produced a hollow core – thin crust and seven (7) combinations produced a solid core. The other 46 combinations all produced various random waveshapes.

Main points:

1) Acceleration equation contains four frequency terms
2) Amplitude and phase empirically determined
3) Solution matrix contains 64 possibilities

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Calculated Y-Axis Data Plots

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Figure 34) "Calculated Y-axis Data Plots" the following plots compare the calculated acceleration equations for the Y-axis back to the proposed ones, with individual plots for each of the different core types.

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Hollow Core (thin) Data

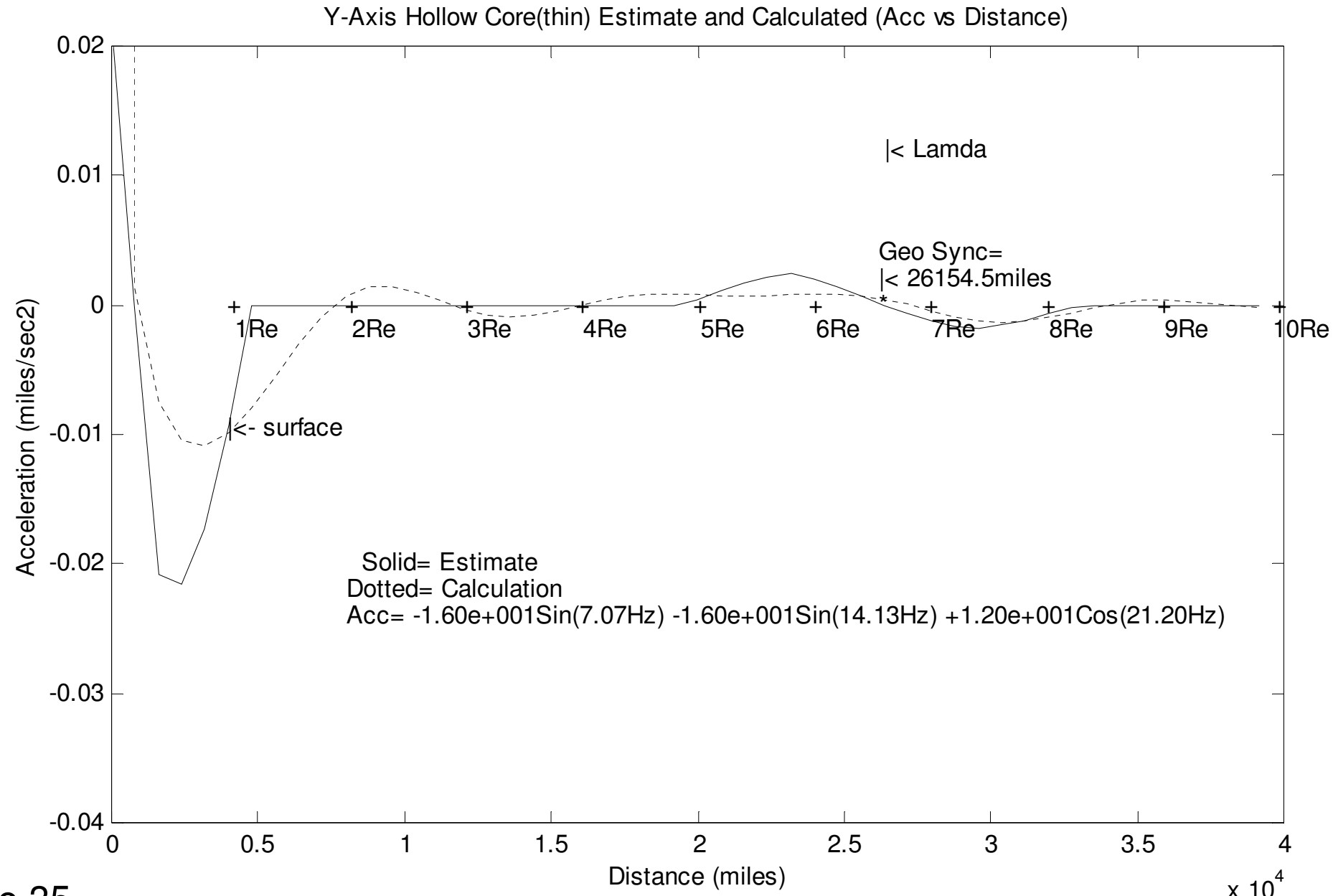

Figure 35) "Hollow Core (thin) Data" plots the best of the six (6) hollow core – thin crust equations back with the proposed hollow core waveshape. As can be seen from the plot the calculated value (dotted line) does not have very good correlation with the estimated one (solid). The conclusion being that the core is not hollow with a thin crust or in mathematical terms the acceleration at the center (R = 0) is not positive.

Main points:

1) Planet core is not hollow core – thin crust
2) Acceleration at R = 0 is not positive

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Hollow Core (thick) Data

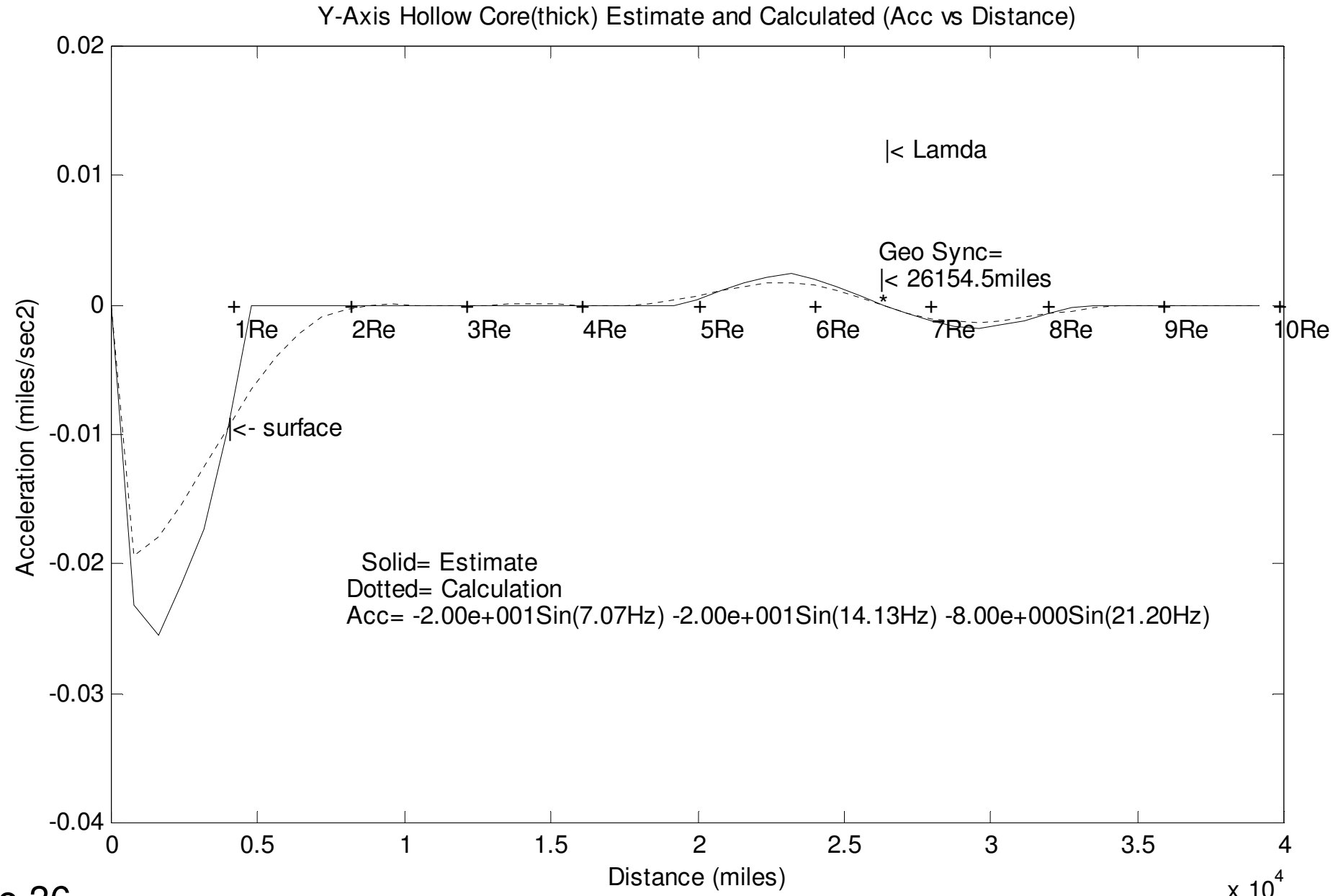

Figure 36) "Hollow Core (thick) Data" plots the best of the five (5) hollow core – thin crust equations back with the proposed hollow core waveshape. As can be seen from the plot the calculated value (dotted line) has a very good correlation with the estimated one (solid). There is also a good match at the surface and GeoSync markers. The conclusion being that the core might be hollow with a thin crust or in mathematical terms the acceleration at the center (R = 0) is zero.

Main points:

1) Planet core might be hollow core – thick crust
2) Acceleration at R = 0 is zero

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Solid Core Data

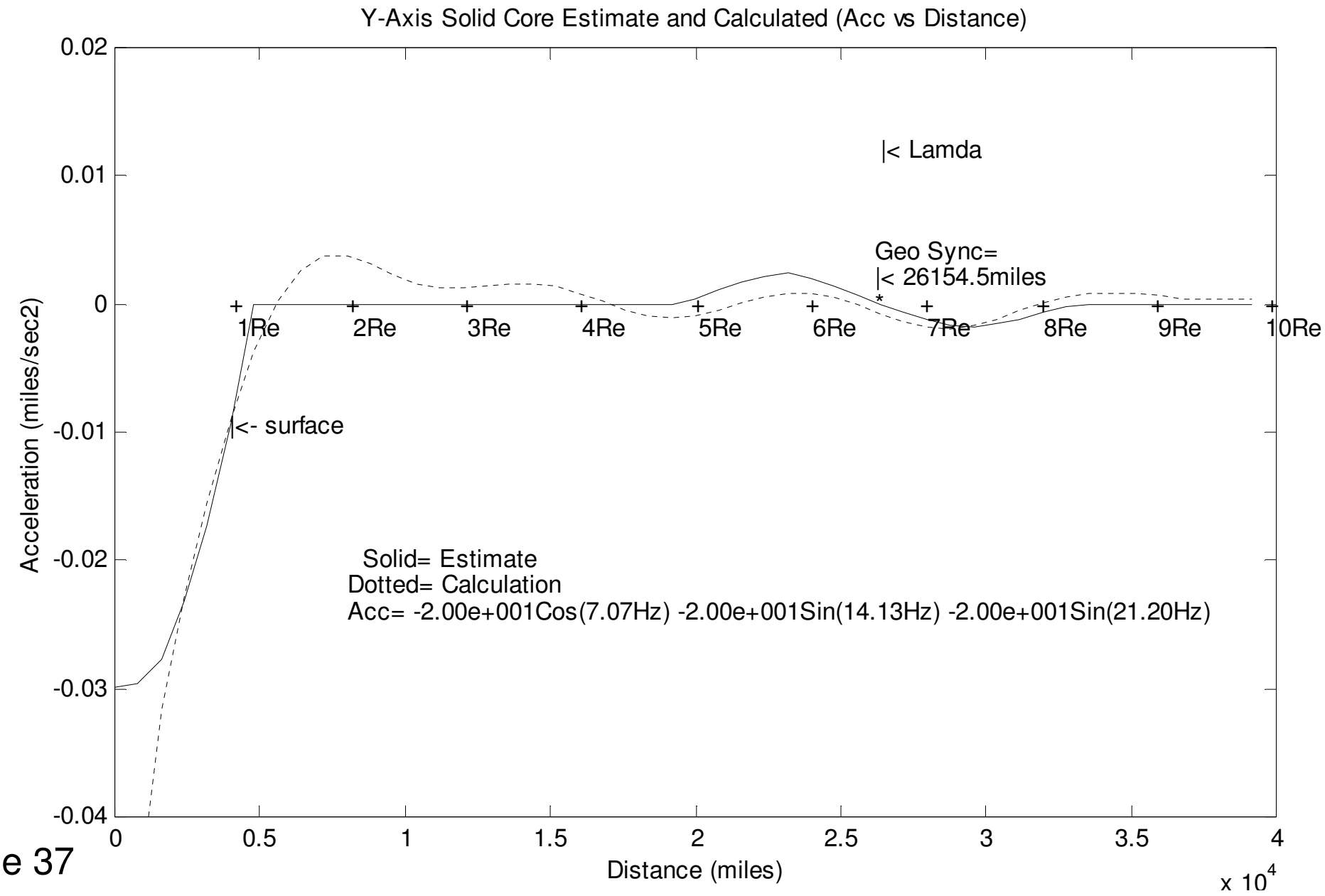

Figure 37) "Solid Core Data" plots the best of the seven (7) solid core equations back with the proposed solid core waveshape. As can be seen from the plot the calculated value (dotted line) does not have very good correlation with the estimated one (solid). The conclusion being that the core is not solid or in mathematical terms the acceleration at the center (R = 0) is not negative.

Main points:

1) Planet core is not solid
2) Acceleration at R = 0 is not negative

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Calculated X-Axis Data Plot

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Figure 38) "Calculated X-axis Data Plot" only has to check the hollow core – thick crust equation in the X-axis as the other two equations hollow core – thin crust and solid core did not correlate in the Y-axis.

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Hollow Core (thick) Data

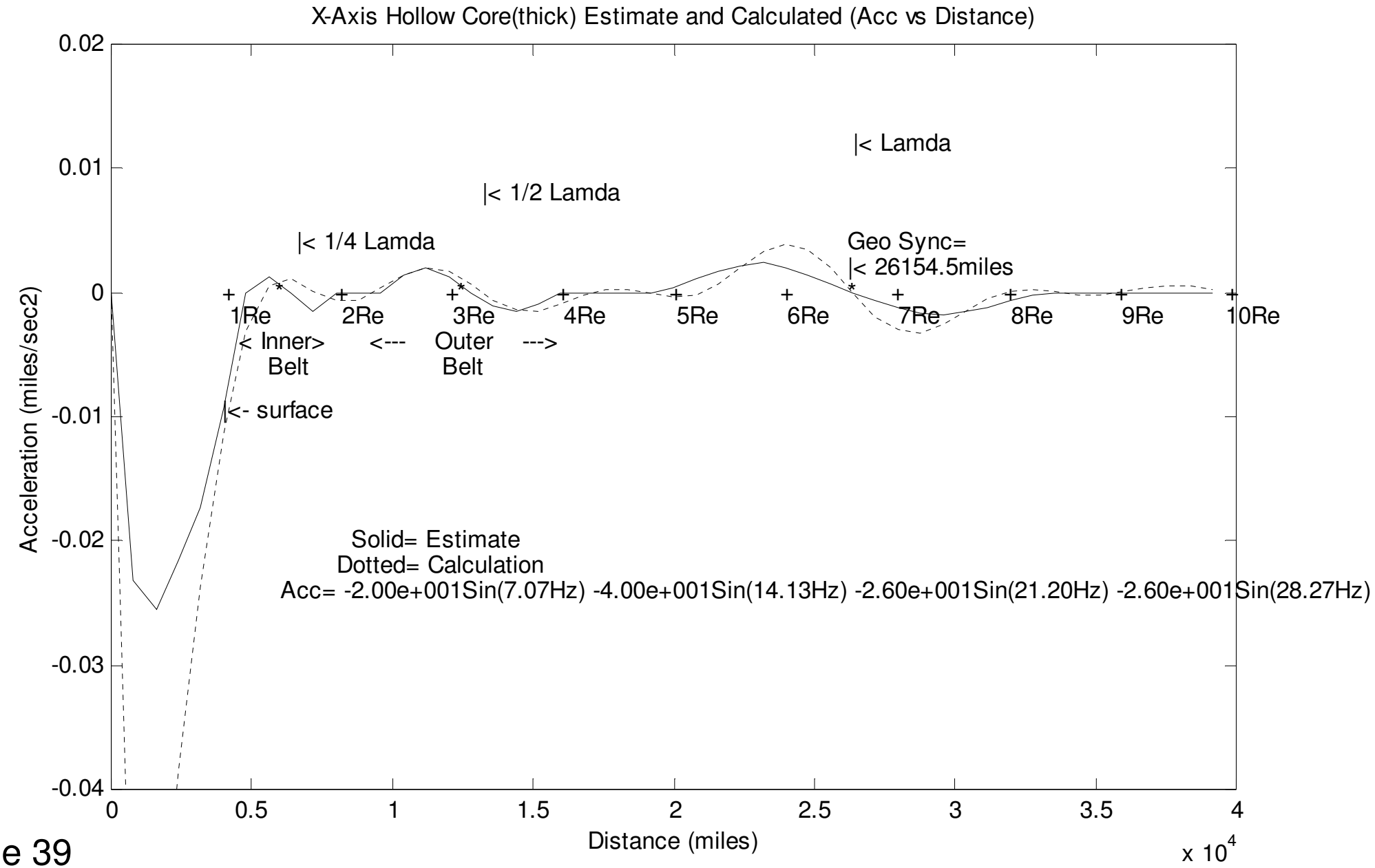

Figure 39) "Hollow Core (thick) Data" as can be seen from the plot the calculated value (dotted line) also has very good correlation with the estimated one (solid) in the X-axis. There is a good match at the surface, outer belt and GeoSync markers though the inner belt marker is a little off. This conclusion confirms the Y-axis data (figure 36) that the core is possibly hollow with a thick crust or in mathematical terms the acceleration at the center (R = 0) is zero.

Main points:

1) Confirms Y-axis plot data
2) Planet core possibly hollow with a thick crust
3) Acceleration at R = 0 is zero

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Analysis of Wave Shape(s)

Proposed VS Calculated

- **Wave shape(s) – time domain**
  - **Feedpoint for Proposed and Calculated is the origin (0,0)**
  - **Y-axis Hollow Core -Thick Crust data tracks the GeoSync and Magnetosphere points the best**
  - **X-axis Hollow Core – Thick Crust data also tracks data**
    - **Inner belt location is offset a few miles**
- **Frequencies and Amplitudes – freq domain**
  - **All frequency data shows FFT quantization error**
  - **All calculated frequencies close to estimated frequencies**
- **Conclusions**
  - **Wave shape will change some with a change in feedpoint (dipole) location**
  - **Using: “Hollow Core - Thick Crust”**

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Figure 40) "Analysis of Wave Shapes (proposed vs calculated)" summarizes the results of all the time domain estimated vs calculated data plots. Conclusion is that the hollow core – thick crust equations tracks both the estimated X-axis and Y-axis the closest. In the frequency domain the calculated frequencies are close to the proposed (estimated) numbers in spite of the FFT quantization errors. Note all these plots were run with a single feedpoint at the origin (0, 0). Waveshapes could possibly change using dipole feedpoints.

Main points:

1) Both time and frequency domain data correlate
2) Confirms core type and acceleration value

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Feedpoint (dipole) Analysis

Hollow Core(thick) Acc Amplitude

- **Frequency Harmonic X-Axis Y-Axis**
  7.07Hz Fund 20.0 20.0
  14.13Hz Second 40.0(2x) 20.0(1x)
  21.20Hz Third 26.0(1.3x) 8.0(.4x)
  28.27Hz Fourth 26.0(1.3x) 0.0
- **A feedpoint dipole in the Y-Axis of Lambda/2 @ 4th Harmonic(28.27Hz) will zero out that harmonic and also reduce the other two harmonics in Y-Axis.**
- **Dipole length of Lambda/2 @ 28.27Hz (4th) = Lambda/8 @ 7.07Hz (Fundamental)**

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Figure 41) "Feedpoint (dipole) Analysis" a closer examination of figures 36 and 39 shows that there are some differences in the constant terms for the Y-axis and X-axis equations. Comparing the two equations the 7.07Hz fundamental frequency has the same gain of 20, but the 14.13Hz second harmonic has double the gain in the X-axis while the 28.27Hz fourth harmonic is completely missing in the Y-axis. To correlate or combine these differences in gains a double (dipole) feedpoint is needed rather then a single feedpoint. Using a half wave dipole (λ/2) feedpoint centered at the origin (0, 0) positioned in the Y-axis will zero the fourth harmonic term and also reduce the other two harmonics in the Y-axis. Converting the 28.27Hz fourth harmonic dipole (λ/2) wavelength back down to the 7.07Hz fundamental frequency requires a division by 4 equaling a wavelength of λ/8.

Main points:

1) Change from single to dipole feedpoints
2) Dipole centered at the origin (0, 0) in Y-axis
3) Fundamental frequency is same amplitude in X and Y axis
4) Second harmonic is reduced amplitude in Y-axis
5) Third harmonic is reduced amplitude in Y-axis
6) Fourth harmonic is canceled in Y-axis
7) Dipole length is λ/8 at the 7.07Hz fundamental frequency Main points:

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X-Axis Dipole Plot

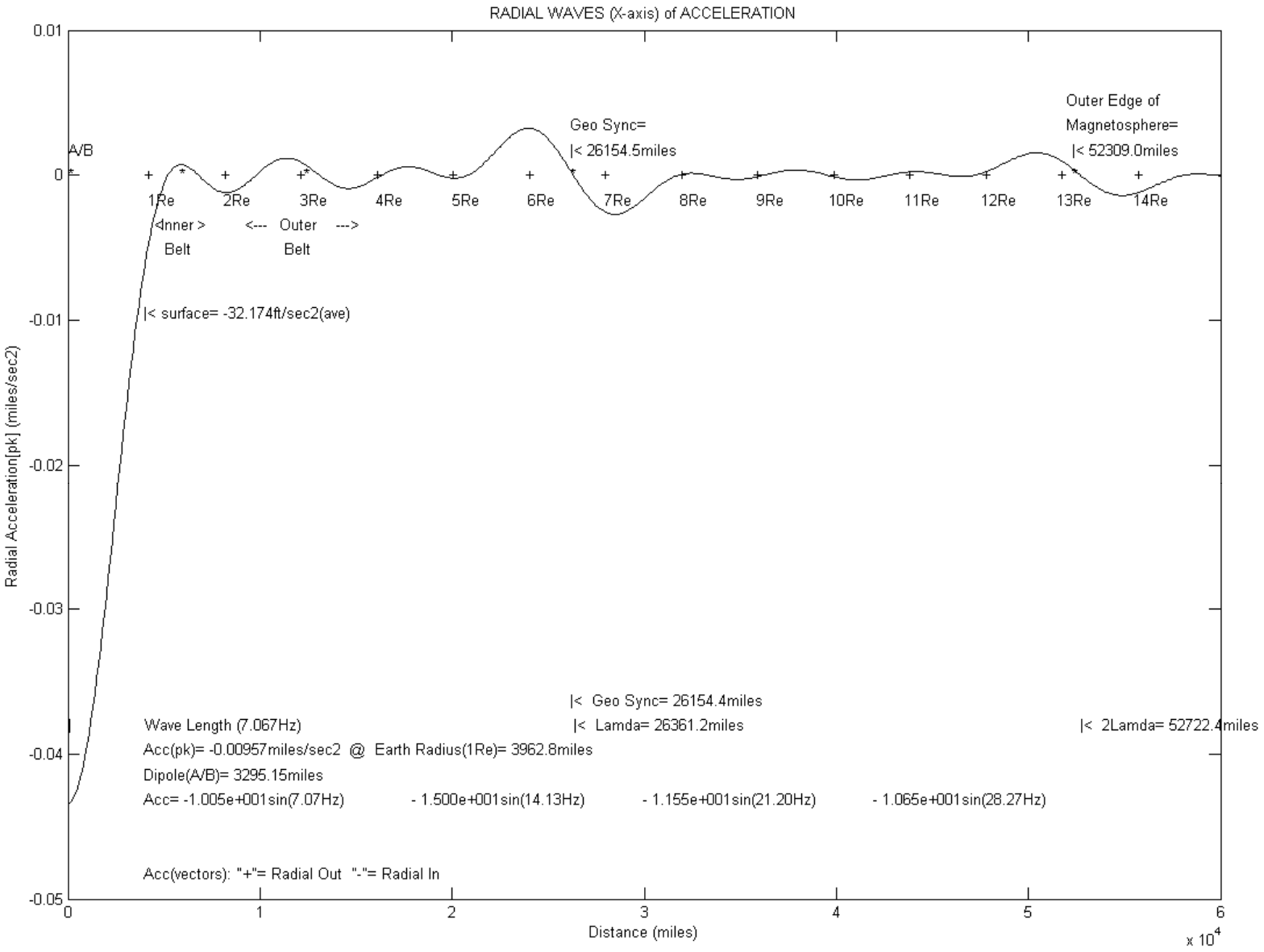

Figure 42) "X-Axis Dipole Plot" shows the results of combining the dipole feedpoints with the equations from figures 36 and 39 which are single feedpoint ones. Only the end of the dipole which is labeled "A/B" can be seen as it is located in the Y-axis (polar) however its effect is greatest in the X-axis (equator). Also, it cleaned up the inner and outer radiation belt curves much better than with a single feedpoint. The largest effect of the dipole is on the core type which changed from hollow core – thick crust to solid core (negative acceleration at R = 0). Plot scaling was reduced to include the magnetosphere edge (R = 2λ).

Main points:

1) Dipole feedpoints
2) Same Inner and Outer belt markers
3) Same GeoSync marker
4) Surface gravity slightly less
5) Core type changed to solid
6) X-axis plot now includes magnetosphere
7) More background ripple

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Y-Axis Dipole Plot

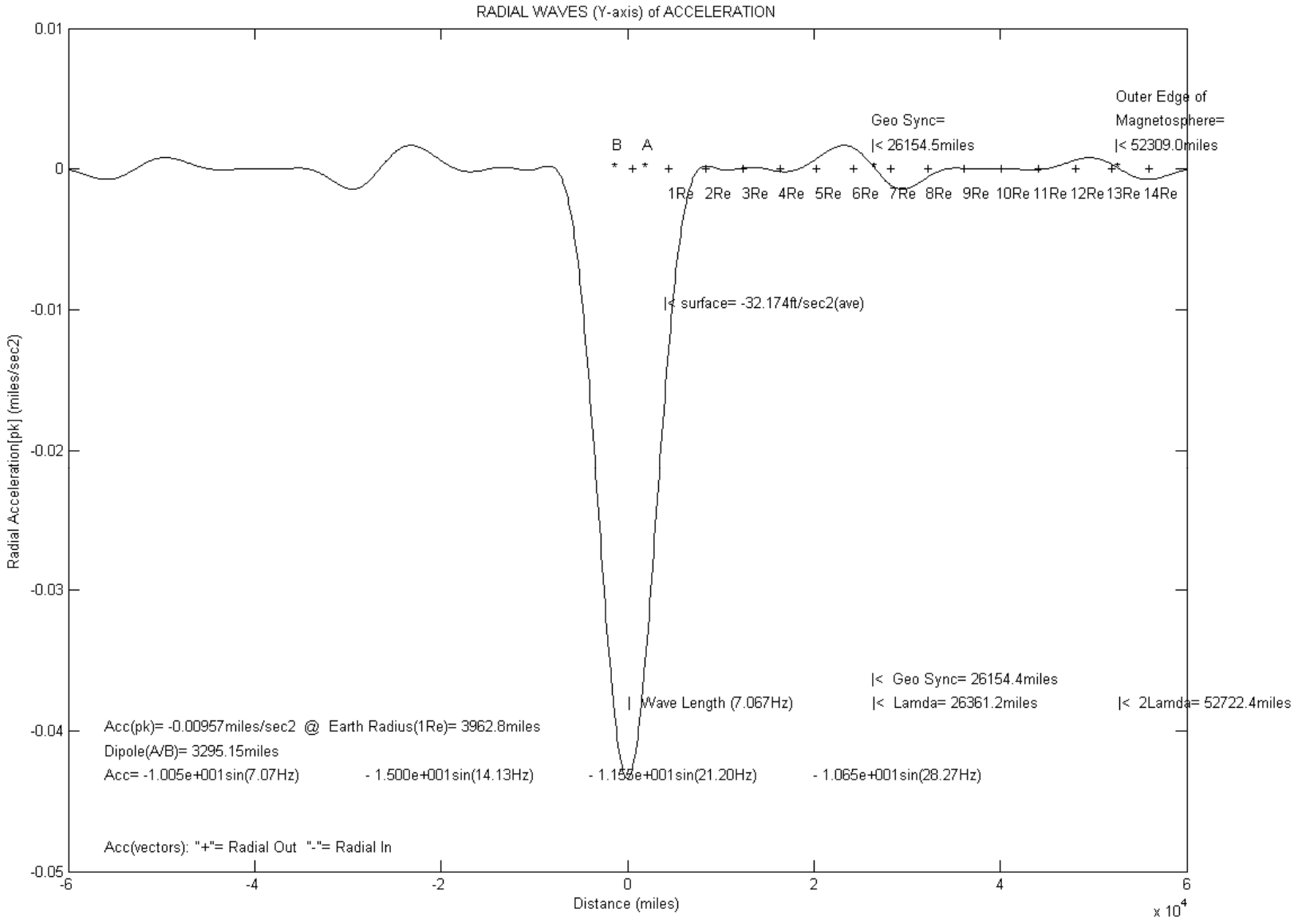

Figure 43) "Y-axis Dipole Plot" shows the same dipole results as figure 42 only in the Y-axis (polar). The λ/8 dipole feedpoints labeled A and B are clearly marked at the origin (0, 0). The equation constants are now the same as the X-axis (equator) because the dipole arrangement corrected the differences. The Y-axis core type remains a solid. Plot scaling was reduced to include the magnetosphere edge (R = 2λ).

Main points:

1) Dipole feedpoints visible
2) Same GeoSync marker
3) Surface gravity slightly more
4) Y-axis core also a solid
5) Y-axis plot includes magnetosphere

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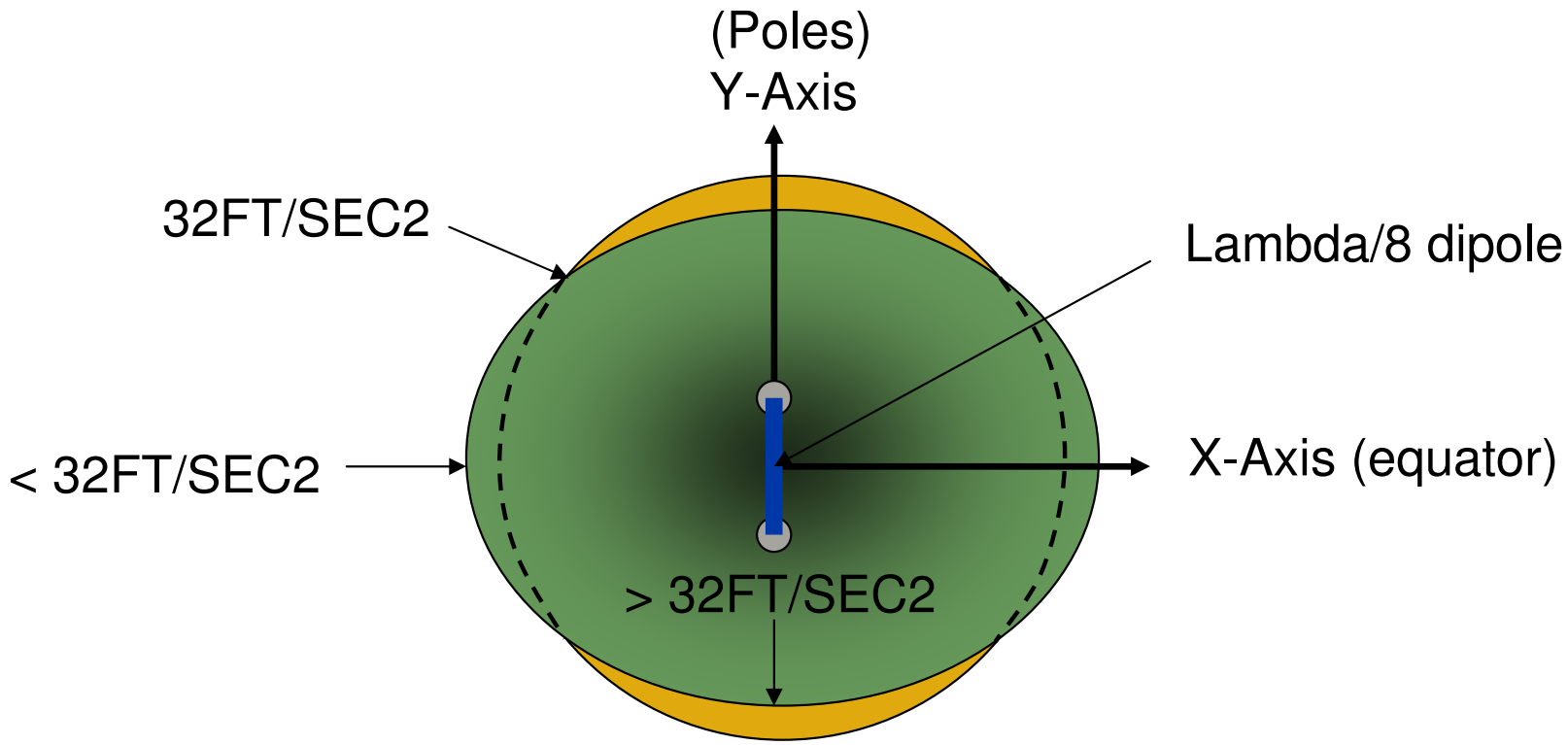
ELLIPTICAL PLANET SURFACE



Planet surface is out of round (flattened at poles) because of unequal (dipole) X and Y axis accelerations

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Figure 44) "Elliptical Planet Surface" taking a closer look at figure 42 shows the X-axis acceleration value is a little less then the 32ft/sec2 surface marker. While figure 43 shows the Y-axis acceleration value is a little greater then the 32ft/sec2 surface marker everything else being the same. Conclusion the planet's surface is slightly elliptical rather then a perfect sphere. The λ/8 dipole arrangement places the feedpoints closer to the surface in the Y-axis which increases the acceleration value causing the polar region to flatten.

Main points:

1) Greater Y-axis acceleration
2) Flattened polar region
3) Elliptical surface (not a sphere)

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WAVE HARMONICS
Planet Structure

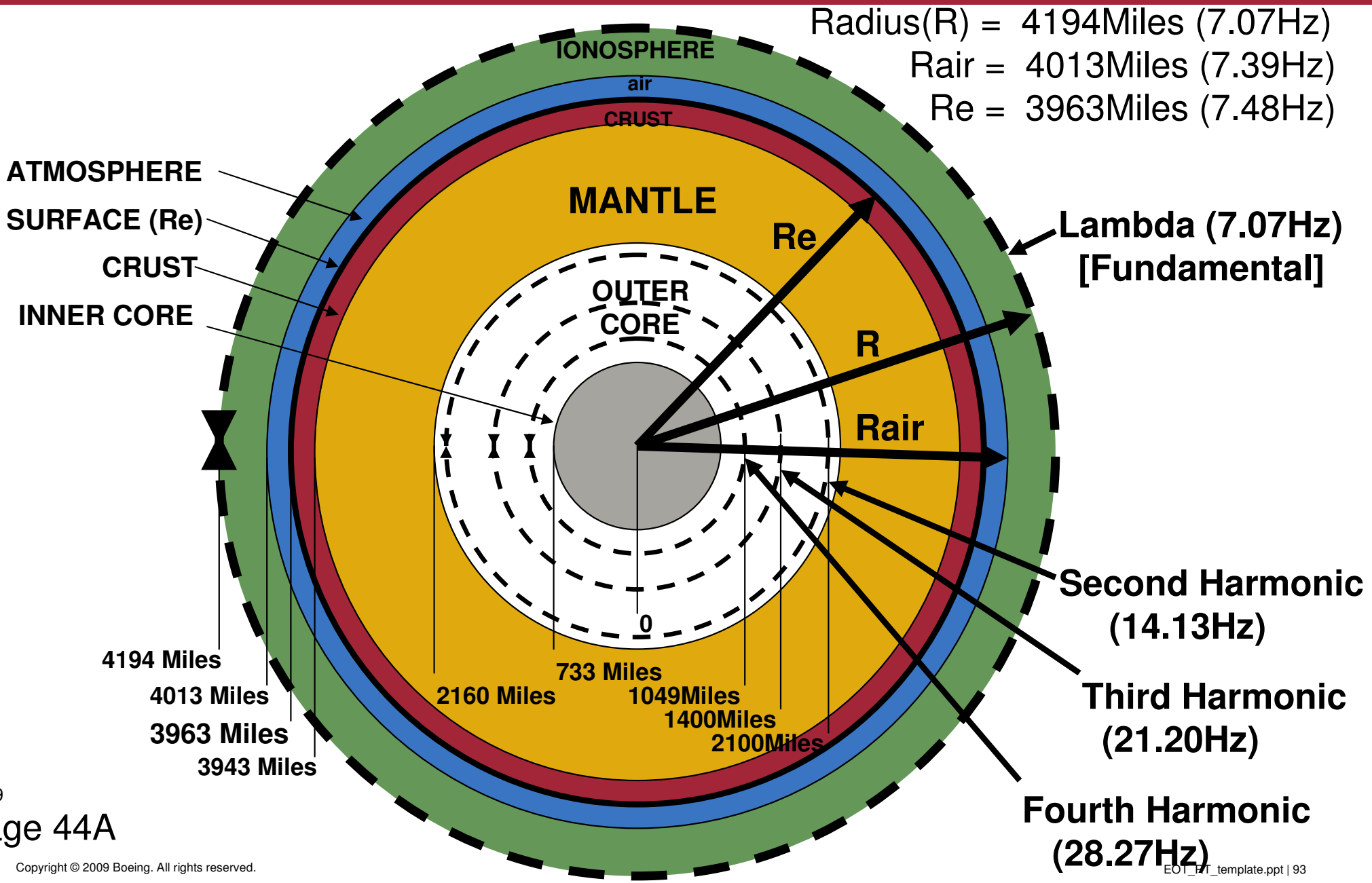

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Figure 44A) "Wave Harmonics (planet structure)" is a more detailed view of the earth's interior core. First, the crust material is solid and brittle. This brittleness is what earthquakes fracture making mountains and valleys. It also conducts electricity as all the world's power grids are "grounded" to it . Second, the mantle material is more plastic or pliable, viscous is the technical term. Its composition is mainly silicates with some traces of iron, if you can think of a granite rock frame as being flexible! This is also the molten material (igneous rock) that volcano's spew out as lava. The mantle is under both high pressure and high temperature. Third, the core material is composed of mostly iron and some nickel, the outer region being in the liquid state. In spite of the high temperatures the acceleration spike generates enough pressure to solidify the inner region making it a spherical iron center. As the core temperature is above the Curie point it can not maintain a magnetic field of its own but, being made of iron it will certainly be influenced by an electromagnetic one. This is the same planet structure data in figure 21A only with the four acceleration wave harmonics (gravity) superimposed on it. As can be seen from the figure the fundamental harmonic completely encloses the entire system including the ionosphere. Second, all the higher harmonics (second, third and fourth) reside in the liquid outer core region. It is all these wave harmonics mixing in the middle of the liquid outer core that cause it to rotate (spin), works just like the motor armature it is. As the core's rate of rotation (revolutions/hour) is much higher than the earth's rotation (revolutions/day) there is a friction line generated in the region of the outer core to mantle interface. It is this friction that causes the planets internal heat. Because it pliable the mantle functions as the earths dynamic spin balancer. If the crust moves out of alignment it causes internal pressures to build up in the mantle correcting it. Also has a built in safety valve, that when too much pressure builds up some volcano will pop (erupt) making a vent. When the heat generated equals the heat lost and spin power equals drag the system becomes stable.

Main points:

1) Fundamental wave encloses entire structure
2) Higher harmonics reside in the outer core
3) Wave mixing causes heat and motion

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Corresponding X and Y 3D Dipole Gravity Plots

1) Space normal orientation
2) Rotated to show harmonic detail
3) FFT harmonic plot

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Figure 45) "Corresponding X and Y 3D Dipole Gravity Plots" the following figures are the same dipole X and Y-axis equations only now they are combined in 3D color plots.

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3D Dipole Plot (normal)

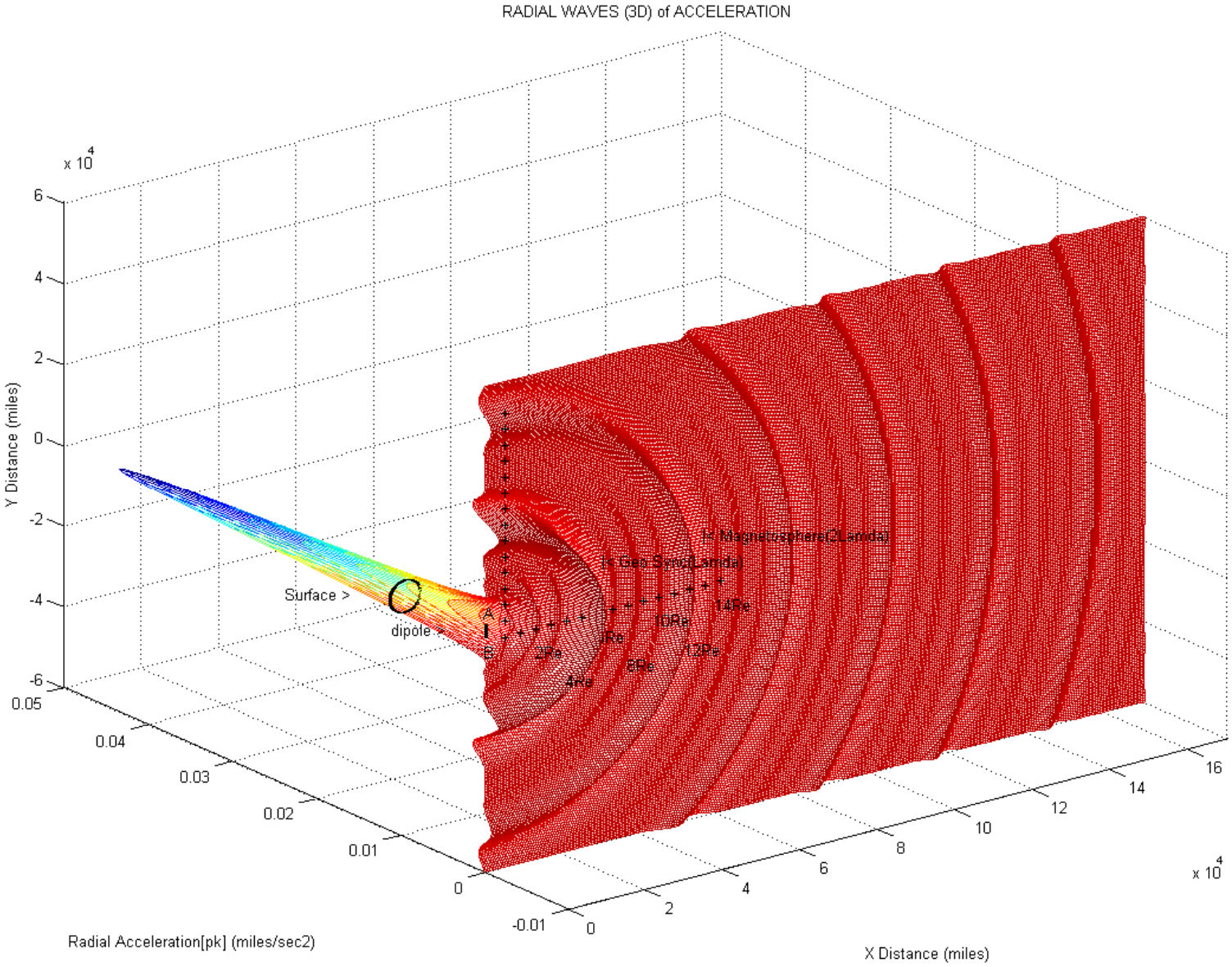

Figure 46) "3D Dipole Plot (normal)" is the space normal view with the dipole positioned vertical on the polar axis. It shows the spherical acceleration (gravity) waves radiating out into space from the dipole along with the earth surface and radius markers. Also visible is the big acceleration spike generating the solid core. Just visible but difficult to see because of plot scaling are the inner belt at 1.5Re and outer belt at 3Re.

Main points:

1) Earths gravity field pattern
2) Surface and radius markers
3) Core generation spike

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3D Dipole Plot (rotated)

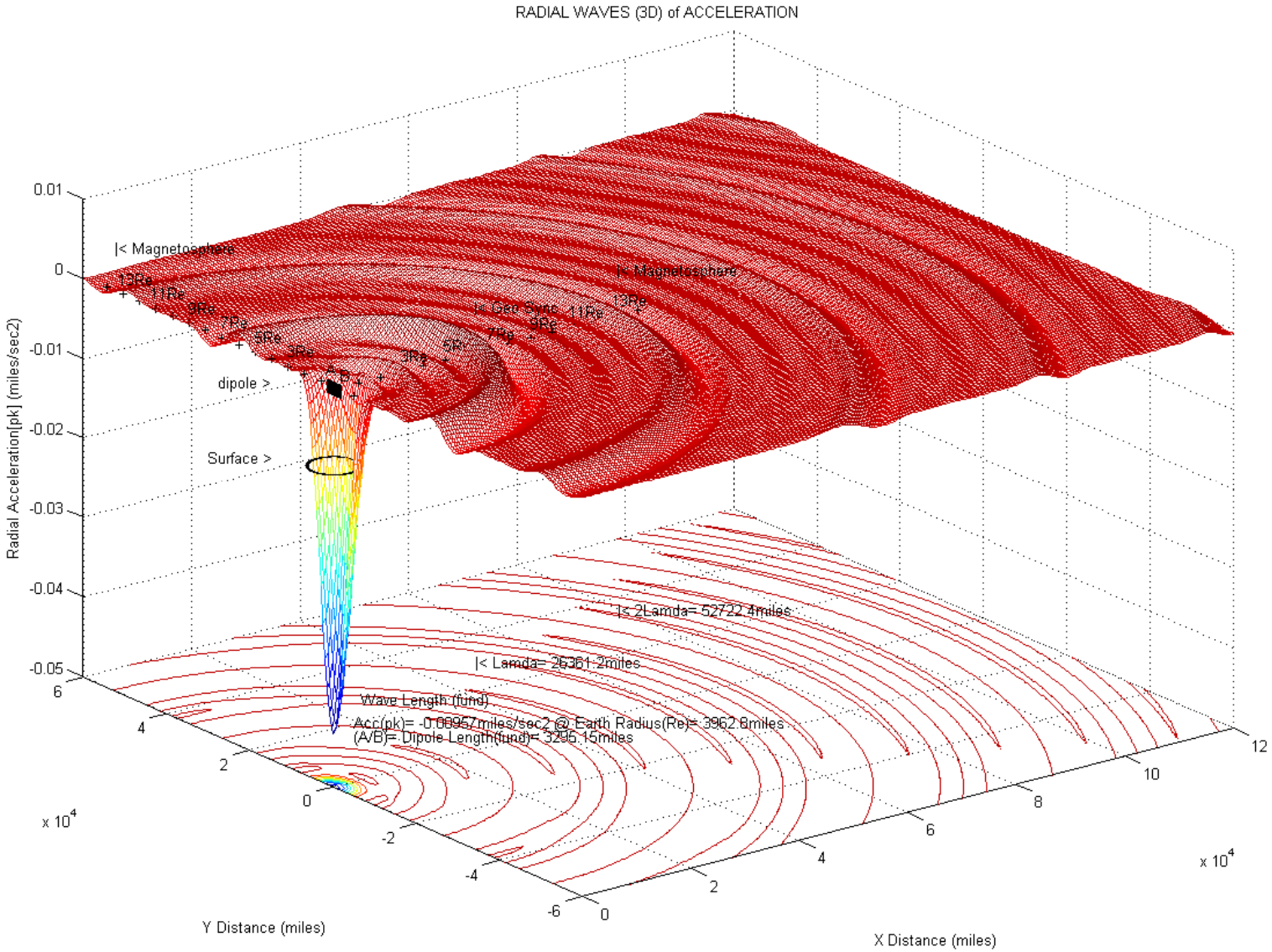

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Figure 47) "3D Dipole plot (rotated)" is the same Dipole plot in figure 46 only rotated 90deg with the acceleration spike vertical. This is a MatLab software requirement to be able to plot the additional contour map below it (all wave data is the same). The contour map enhances some acceleration wave details.

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FFT of 3D Dipole Plot

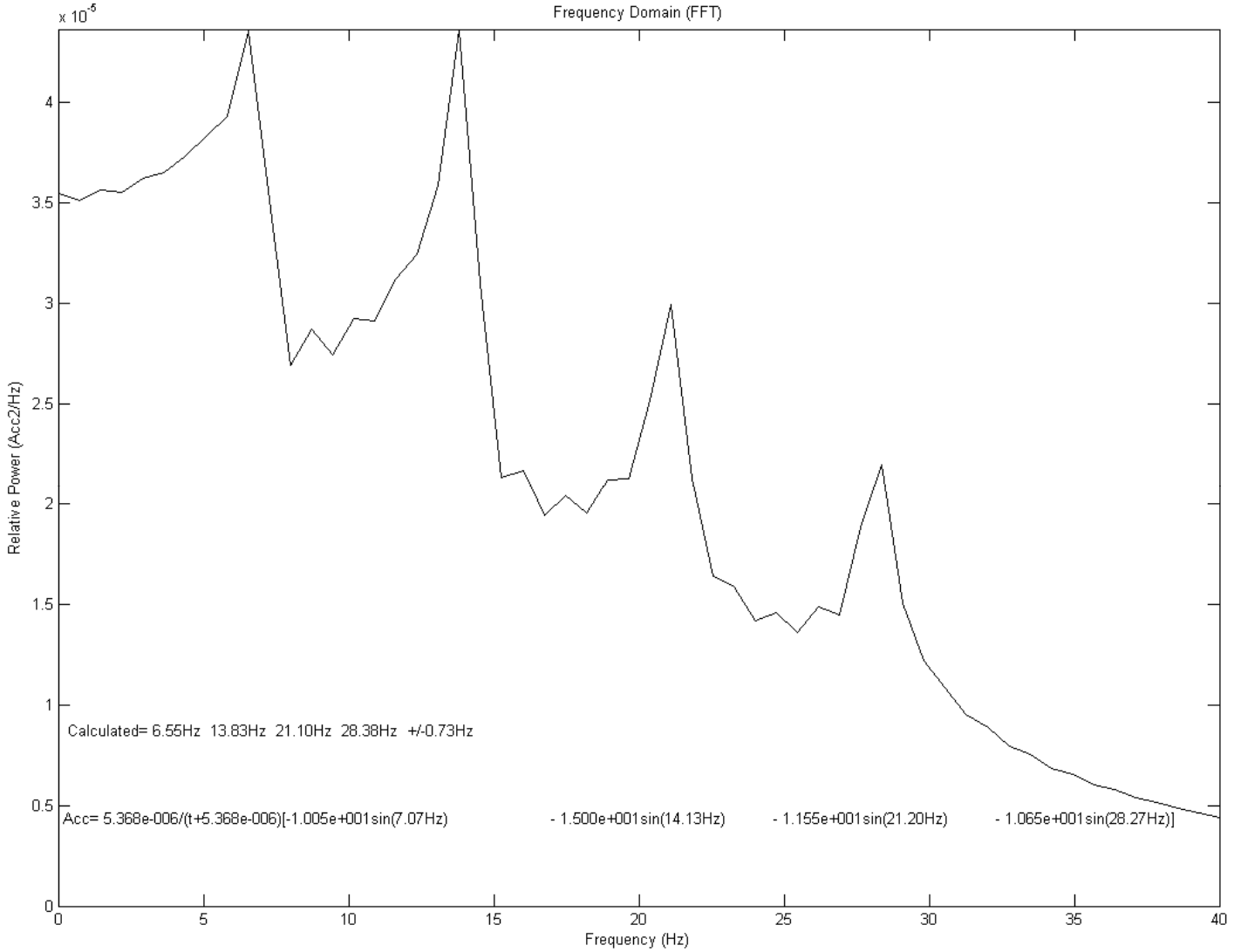

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Figure 48) "FFT of 3D Dipole Plot" shows the four acceleration (gravity) wave harmonics in the frequency domain. This waveshape is very similar to the estimated FFT for the proposed solid core waveshape in figure 30. It has two high peaks at 7Hz and 14Hz and two small peaks at 21Hz and 28Hz all in descending order.

Main points:

1) Four harmonic frequencies
2) Wave amplitude in descending order

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TESLA MEASUREMENTS

Colorado Springs Experiments
(1899 – 1900)

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Figure 49) "Tesla Measurements" the following is short tutorial on Tesla's Colorado Springs experiments preformed back around the turn of the century. They are relevant to this "Study of Gravity" as he measured the electromagnetic frequency spectra of the earth.

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Tesla Measured Data

Electromagnetic frequency spectra of earth:

7.8 Hz @ 0.12mW/Hz

14.1 Hz @ 0.10mW/Hz

20.0 Hz @ 0.06mW/Hz

25.0 Hz @ 0.05mW/Hz

FFT Plot:

Plot data (four freqs) using 180deg phase (-sin)

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Figure 50) "Tesla Measured Data" shows the four frequencies and power levels he obtained from his electromagnetic experiments. The frequencies that Tesla measured were a 7.8Hz fundamental, a 14.1Hz second harmonic, a 20.0Hz third harmonic and a 25.0Hz fourth harmonic.

Main points:

1) Measurements made a 100 years ago
2) Tesla's numbers still valid
3) Four electromagnetic frequencies

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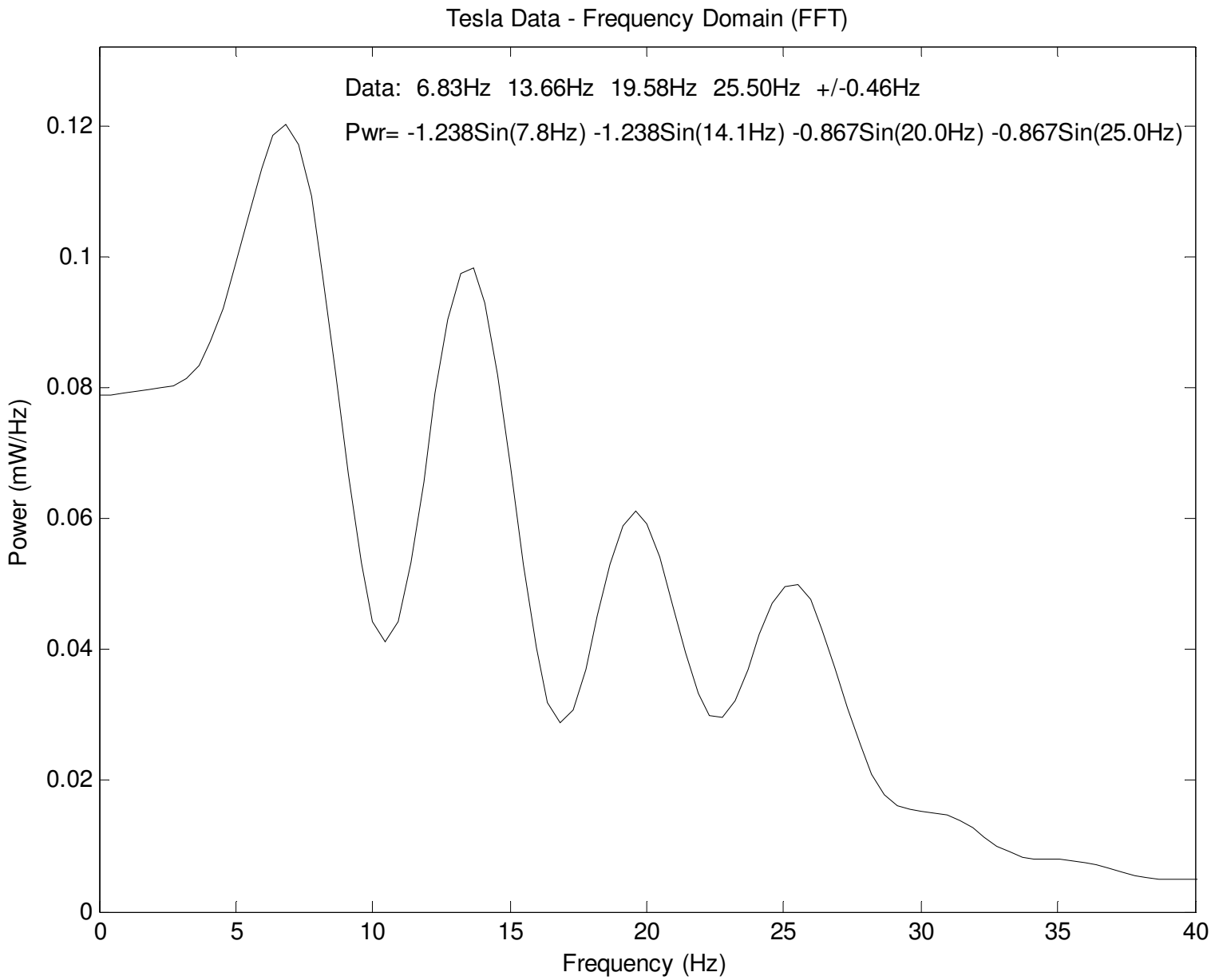
Tesla Measured Data FFT



Mg07

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Figure 51) "Tesla Measured Data FFT" is the Fourier analysis plot in the frequency domain using Tesla's frequency data from the previous figure. Note the similarities to the FFT of 3D dipole plot of figure 48. It has the same two high peaks at 7Hz and 14Hz and two small peaks at 20Hz and 25Hz all in descending order. Also, it has a much smoother waveshape.

Main points

1) Four harmonic frequencies
2) Amplitude in descending order

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Schumann Resonance Data

Electromagnetic frequencies:

7.83 Hz First Harmonic
14.1 Hz Second Harmonic
20.3 Hz Third Harmonic
26.4 Hz Fourth Harmonic
32.4 Hz Fifth Harmonic

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Figure 51A) "Schumann Resonance Data" is essentially the same data as Tesla measured much earlier only with an additional fifth harmonic. Tesla's numbers disappeared for many years only to reappear in the late 1950s under a different name. At the time I started this study I knew nothing about "Schumann Resonance" only had Tesla's data. He never got much credit for any of his work (power grid, electric motors).

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GRAVITY CONCLUSIONS

What it is

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Figure 52) "Gravity conclusions" this is the wrap up of the "Study of Gravity" (part1). The following figure summarizes the major points of this study.

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Gravity

- Generated by long (low freq) standing waves of radial acceleration
- Composed of a fundamental and three harmonics
  - Fund: 7.07 Hz - Second: 14.14 Hz
  - Third: 21.21 Hz - Fourth: 28.28 Hz
- Y-Axis dipole feedpoint – Lambda/8
- Solid core (Acc = negative @ R=0)
  - Dipole shifted Acc @ origin from 0 (hollow) to negative (solid)
  - Solid means - not hollow (might be liquid)
- Acceleration at surface not the same in X and Y axis
  - Dipole flattened polar (Y) axis
- First three (fund, second, third) harmonics generate the outer magnetosphere (shell)
- Fourth harmonic generates the radiation belts (donuts)
- Frequency determines Scale Factor (SF) - Size
  - Works for atoms (high Ghz)
- Electromagnetic origin (Tesla data)
  - Similar FFT plots

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Figure 53) "Gravity" compiles and lists all the data and information obtained from the research and number crunching done in taking a detailed look into this subject. The gravitational system of earth is composed of an accelerating force generated by long (low frequency) standing waves which do far more than just make the 32ft/sec2 surface acceleration commonly called gravity. These waves extend out some 60,000miles (2 wavelengths) into space generating the complete Magnetosphere, a stable GeoSynchronous orbit and both the inner and outer Van Allen radiation belts. This waveshape is composed of four frequencies a fundamental and three higher harmonics. The numbers being 7.07Hz for the fundamental, 14.14Hz for the second harmonic, 21.21Hz for the third harmonic and 28.28 for the fourth harmonic. Looking the other way towards the center of the earth the fundamental frequency determines the outer edge of the ionosphere while the three higher harmonics reside in the planets outer core region. This wave mixing causes the internal heat, pressure, forces and rotation of the planet. These waves are sourced or concentrated at dipole feedpoints located on the Y-axis centered about the origin (0, 0); dipole distance being $\lambda/8$ at the fundamental frequency. The dual feedpoints cause a number of modifications to the system. First, it changes the core type from hollow (thick crust) to solid. Solid meaning not a hollow structure could be liquid or a combination of liquid and solids. Second, it causes a flattening of the polar region changing a round sphere to egg shaped or an ellipsis. Third, it generates the crescent shaped inner and outer radiation belts. The first three harmonics primarily determine the planets structure, GeoSync orbit and the magnetosphere while the fourth harmonic contributes the two radiation belts.

In doing the data reduction and number crunching two other facts were uncovered that are not directly related to the gravity study but need to be documented as well. First, it appears that frequency determines the size or scale factor of a structure. If this is true then atoms would have a similar type structure only much smaller in size (very high frequency – GHz). Second, the waves of accelerating force seem to be of electromagnetic origin. They track or correlate with the earth's electromagnetic waves discovered by Tesla and Schumann in both frequency and amplitude much too close not to be connected to them. The analysis of this electromagnetic connection is the subject of the "Study of Gravity" (part2).

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