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The Generator Polyhedron by Panagiotis Stefanides, proposed form of *"the other genus-genus of the soul"* in Plato's Epinomis, of the *"soul of the world"* in Timaeus and of the Republic's *planetary system structure.*

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As I anticipate, it concerns another *genus* of Polyhedron, a very Special one Ontologically, and this is very important I understand:
"....Στερεὰ δὲ σώματα λέγεσθαι χρὴ .... πέντε, ..., τὸ δὲ ἄλλο γένος ἅπαν ἔχει μορφὴν μίαν· .....ψυχῆς γένος"
http://remacle.org/bloodwolf/philosophes/platon/cousin/epinomisgrec.htm
[..there are .. five solid bodies.... the other genus which in total has one form ...the genus of the soul…] Plato's *Epinomis* 981b. In 981a, of this work, Plato states that the composition of, soul and body bares a single form.

Similarly, Plato in *Timaeus* [53 E] refers to the solids having each its own *genus* and in his *Republic* makes reference to the Construction of the Universal Planets [XIV 616 E -617A].

Interpretation for *γένος genus – form*] Proposed By Panagiotis Stefanides is the "*Generator Polyhedron*", ohis recent Abstract. Searching, for many years, Plato's Timaeus Work, geometry related to the creation of the world- *soul of the world*] and presenting it to conferences nationally and internationally, I searched in the Liddell and Scott reference for the word "*γένος*" found in Plato's "*Epinomis*" 981b Discovered [Invention [03 April 2017].
https://www.linkedin.com/…/generator-polyhedron-platonic-e…/ .
"Generator Polyhedron" refers to the geometric characteristics of this Solid found to be the root upon which other Solid Polyhedra are based i.e. the Platonic/Eucleidean Solids [Icosahedron Dodecahedron etc.] The Geometry of this paper is part of book: [ISBN 978 – 618 – 83169 – 0 - 4], National Library of Greece , 04/05/2017, by Panagiotis Ch. Stefanides.

Keywords. *Generator Polyhedron, Platonic – Eucleidean Solids, Polyhedra, Geometry, Plato's Epinomis, γένος - Solids [Pl Ti 53 E].*

1.Introduction

Since 1985, I posed a Conjecture to myself, that there should be at least one reliable formula or method [possibly a ruler and compass one] with its proof for the value of π [as there are many of the kind, but not leading to the same exact value].The concept envisaged, should involve Eucleidean Geometry [as it bears reliable consequence, and should be easily examined for its truth or not].
Amongst the various methods that I have come to, [and delivered to various conferences and exhibitions, nationally and internationally], for some classical problems' solutions,
http://www.stefanides.gr/Html/Classical_Problems_et_Alii_with_Web_Links.html

[which to me are very interesting and challenging], are problems with theoretical geometric solutions and proofs, simply, by ruler and compass with purpose of performing, as far as possible, more analytic and more simplified presentations.
The work presented [Generator Polyhedron] resulted from elaborating on my work "Treatise on Circle" which concerns 3 concentric circles in ratio to each other of $4/\pi$ (or square root of the golden ratio), analyzing and comparing the results, for evident conditions for found Symmetries or Dissymmetries and consequently conditions for Harmony or Disharmony.
Part of this paper is, an extract of my published book [ISBN 978 – 618 – 83169 – 0 - 4] titled: Treatise on Circle – Generator Polyhedron Harmony and Disharmony Condition of Three Concentric Circles in Common Ratio.
"Generator" refers to the geometric characteristics of this Solid found to be roots of the other Solid Polyhedra or roots the other Polyhedral are based on i.e. Platonic/Eucleidean Solids [Generator Polyhedron Structure is based on the Square Root of the Golden Number(Icosahedron Structured upon) and Dodecahedron is based on the Square of the Golden Number].

2. Plato's Epinomis and Timaeus

Interpretation Proposal of the Other Genus [*γένος- genus*]

…. The FiveSolids and the Other Genus…Επινομίς Πλάτωνος 981 b

…. On the most likely account there are to be reckoned five solid bodies, from which one might fashion things fairest and best; but all the rest of creation has a single shape, for there is nothing that could come to be without a body and never possessing any color at all, except only that really most divine creature, the soul…. Plato's Epinomis 981b…http://www.perseus.tufts.edu/hopper/text…

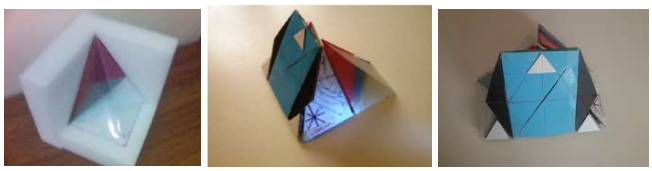
Plato in Timaeus [53 E] refers to the solids having each its own genus [... *καθ' έν γένος έκαστον όν.*] In Pl.Ti. 34B – 36D, Plato describes the formation of the soul [*ψυχή]* of the world involving 7 circles [3 of a similar behaviour and 4 of another one] having reference to the planetary system with Earth in its center and the whole surrounded by the fixed stars as the 8th circle, the celestial sphere [circles named also *bowls or whorls - "σφόνδυλοι"]* and the *" άτρακτος "* structure (spindle - *"αδράχτι"*) rotating by the " *ηλακάτη*" the universal axis passing the middle of the 8th circle straight through (Earth) to the other end [Plato's Republic XIV 616 E -617A .Myth and cosmology of Plato's explanations of how the known celestial bodies revolve round Earth]. Here we have similarities with reference to Plato's "Timaeus and Kritias" myth of the Atlantis and creation of the cosmos, followed the next day after the symposium, where Plato discussed his Republic held at the house of Kephalos in Piraeus. We visualize here the contrast between the harmonized world's creations on the one hand and on the other its civilization's destructions from natural causes, followed after international wars.

Concerning time for Plato, it started with creation and it is the moving image of eternity proceeding according to numbers:…..[Timaeus 37 -39] : ...He planned to make a movable image of eternity, He made an eternal image, moving according to number, even that which we have named Time...…Time, then, came into existence along with Heaven, to the end that having been generated together they might also be dissolved together.

For the author the following refers 7 forms (involving numerators of length [L] powers in ratio denominators of time [T] ones), which appear to derive one from the other and thus related. These forms (relationships) necessary for the creation of a (powerful) work element, from its conceptual idea to materialization are Line, surface, volume per unit time (mass rate of unity water density), momentum, 4 force, work (or energy) and power. Of interest is the third form when time gets the value 1 i.e. time existence and L^3 represents mass [volume or of unit density]. L^1 / T^0 , L^2 /T^0 , L^3 /T^1 , L^4 /T^1, L^4 /T^2, L^5 /T^2, L^5 /T^3. Length (L^1) and surface (L^2) are timeless (T^0 =1), Encephalic Concepts i.e. lines, surfaces. It is of interest to indicate that Plato distinguishes names of solids [*Fire, Aer, Earth, Water*] from the same used for the elements. According to my theory Plato's elements are forms of lines configuring orthogonal triangles [one scalene and one isosceles] as showing in this paper. Upon this [from lines, triangular areas] Plato forms volumes and thus matter of the polyhedral, world cosmos and the bearing nature within it. The scalene orthogonal triangle is that one born by the proposed Plato's "*Most Beautiful Triangle*".

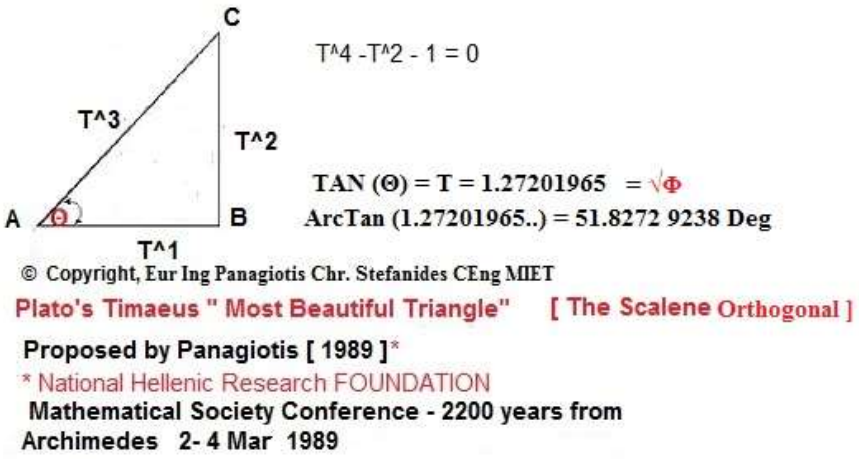
3. Theory Proposed for Building Blocks of Matter [*World*] Based on Plato's Timaeus.

Platos Cosmological Assumption of Forms Existing before Creation; "Being *[όν]* , Space [*χώραν*] and Becoming [*γένεσιν*]" - Pl.Ti 52D , Quintesence [Plato's "*fifth consistency – ξύστασις"* Pl.Ti 55C.], Four Elements *[traces of- i.e. matter*] *in disorder*, *transformed* by God via *ideas and numbers* Pl. Ti 53B. Time [*motion- eternal image, moving according to number, ... that which we have named time....* Pl. Ti 37-39 .Here *traces of elements* is important as they are *material* and thus recognizes Plato's world of *solid structures* [and *not imaterial volumes*] of the Polyhedra, i.e. baring *matter*. Solids' geometry is based on decoded Plato's "*Most Beautiful Triangle"* [similar to this consistent part of this but not the same and not as beautiful is the *Magirus's given to Kepler triangle*], formatting the "*Somatoides Tetrahedron"* as the basic form for building blocks of matter. Use of this "Triangle", with its involved, ubiquitous, quadrature of the circle, serves as a unification theory binding matter, as is the case of the world of Platonic-Eucleidean Polyhedra and finally generating, the *"Generator Polyhedron"* which interrelates them all.



(a) (b) (c)

Figure 1: *(a) 1/4 Great Pyramid Model [Somatoides , red Tetrahedron], (b) one[4/4] Great Pyramid Model, forming, from one of its 4 face triangles, one Parelellogramme [of the 3] of the Icosahedron Skeleton Structure - bluish green : (c)].*



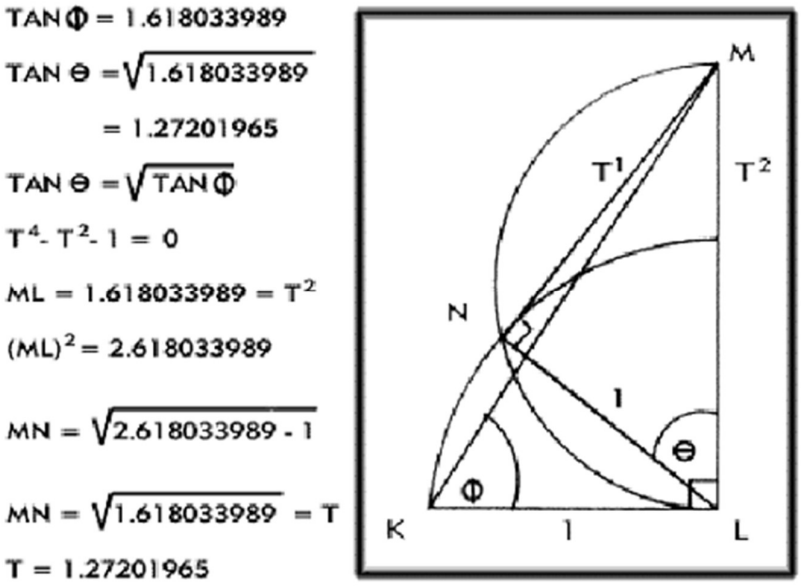


Figure 2: *Plato's Timaeus Most Beautiful Triangle Interpretation [P.Stefanides1989], Complying with Solution of the Equation : X^4 +16X^2 – 256 = 0, X = 4/T = 3.14460551..*

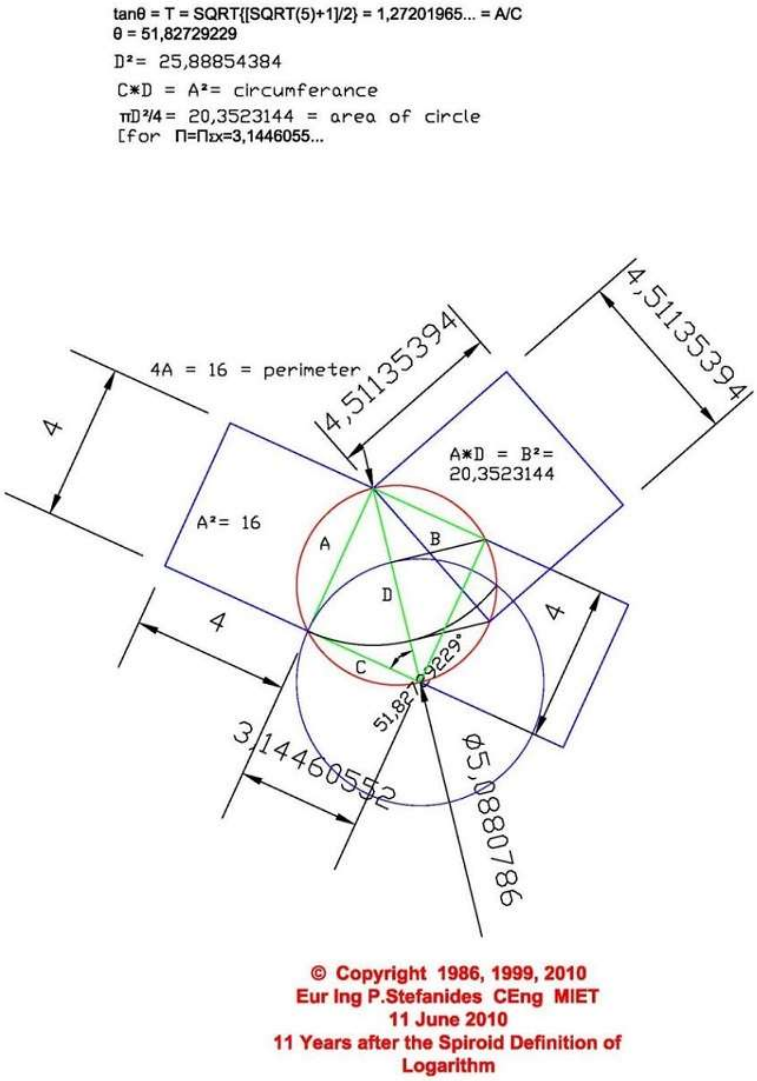


Figure 3: *Quadrature of Circle Theorem Configuration. Geometry,Vector and Co-ordinates Definition By Panagiotis Stefanides. AutoCad Computations by Dr. Giannis Kandylas.*

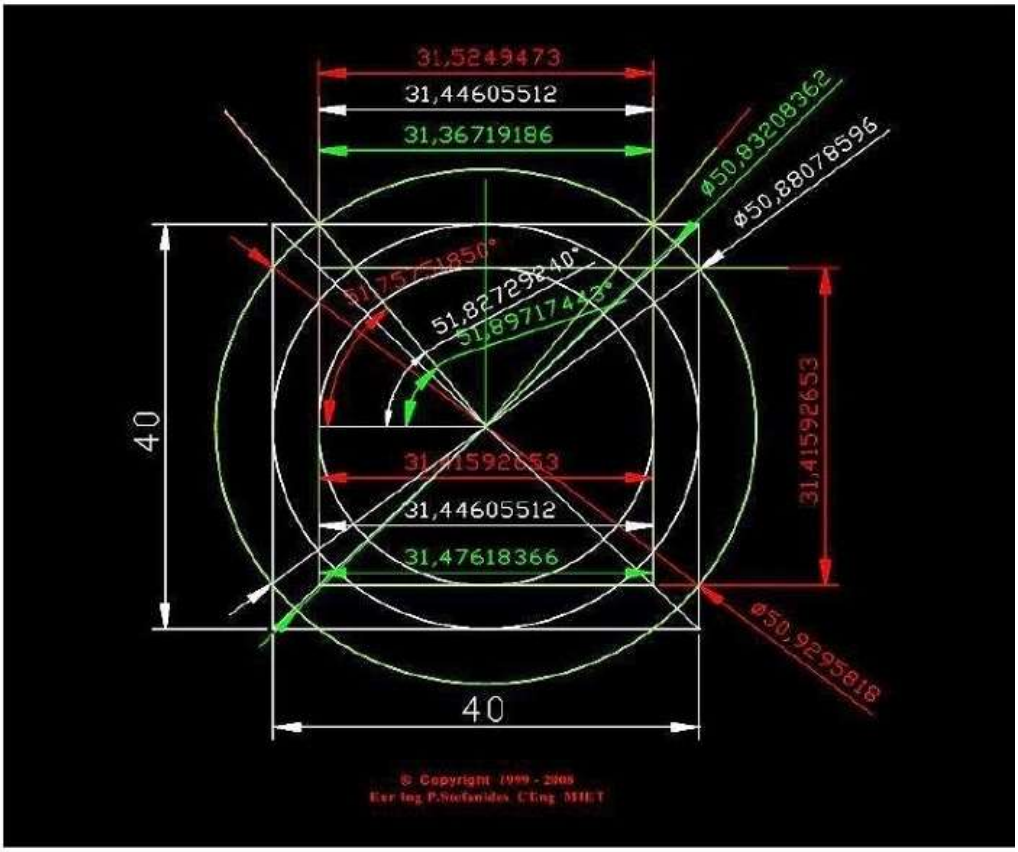
D^2 – A^2 –C^2 =0 or, [16/π]^2 - [π]^2- 16=0

FOR VALUE OF π =3.14460551.. THE VALUE OF DIAMETER = [16/ π] = 5.0880786.. CIRCUMFERENCE = 16 = A SQUARE WITH SIDE [4]=QUARTER CIRCLE. THIS QUARTER SIDE [4] MULTIPLIED BY THE DIAMETER [16/ π] EQUALS [4]*[16/π] = = [64/ 3.14460551..] = 20.3523144.. ROOT OF THIS IS A SQUARE OF SIDE 4.511353943.. AREA OF CIRCLE OF DIAMETER [16/π] = [π/4]*[16/π]^2 = [0.786151378..]*[5.0880786..]^2 = [0.786151378..]*[25.88854384] = = 20.35231441.. THIS AREA OF CIRCLE IS EQUAL TO THE SQUARE OF SIDE 4.511353943..

THREE CONCENTRIC CIRCLES IN COMMON RATIO of 4/π

For $\pi = 4/\{\sqrt{[\{(5)+1\}/2]}\} = 4/1.27201965\ ] = 3.1446055..= 4/T$

QUADRATURE OF CIRCLE GEOMETRICAL UNIFICATION
OF MICROCOSMOS AND MACROCOSMOS



QUADRATURE OF CIRCLE
MICROCOSMOS Geometrically Related to the MACROCOSMOS
" Nested Circles, Squares, Triangles"
Quadrature of the Circle, Compass and Ruler - NOVEL CONCEPT - via "The Quadrature Triangle"
CONFIGURATION EXHIBITNG MAXIMUM SYMMETRY
For Value of $\pi = 4 / \sqrt{\varphi}$ [= 3.14460551..]
Circumference of Circle [D = 40* $\sqrt{\varphi}$ =50.88078596..] = Square [Side 40] Perimeter, and
Product 40*D= Area of this Circle = A Square area of Side 45.11353941..
Geometry Design and Vector Definition of Coordinates by P.Stefanides, http://www.stefanides.gr
AutoCad Computerized Drawing by Dr. J. Kandylas
© Copyright 1987 - 2016, Eur Ing Panagiotis Chr. Stefanides CEng MIET

Figure 4 : *Quadrature of Circlε-3 Concentric Circles in Common Ratio of 4/π.*

MAXIMUM SYMMETRY POINT PCST

POINT ON THE CIRCLE THE SQUARE THE TRIANGLE

RED LINES REPRESENT SHIFTED SYMMETRY [π = 3.141592654..]

BLACK LINES MAX SYMMETRY FOR [π = 3.14460551..]

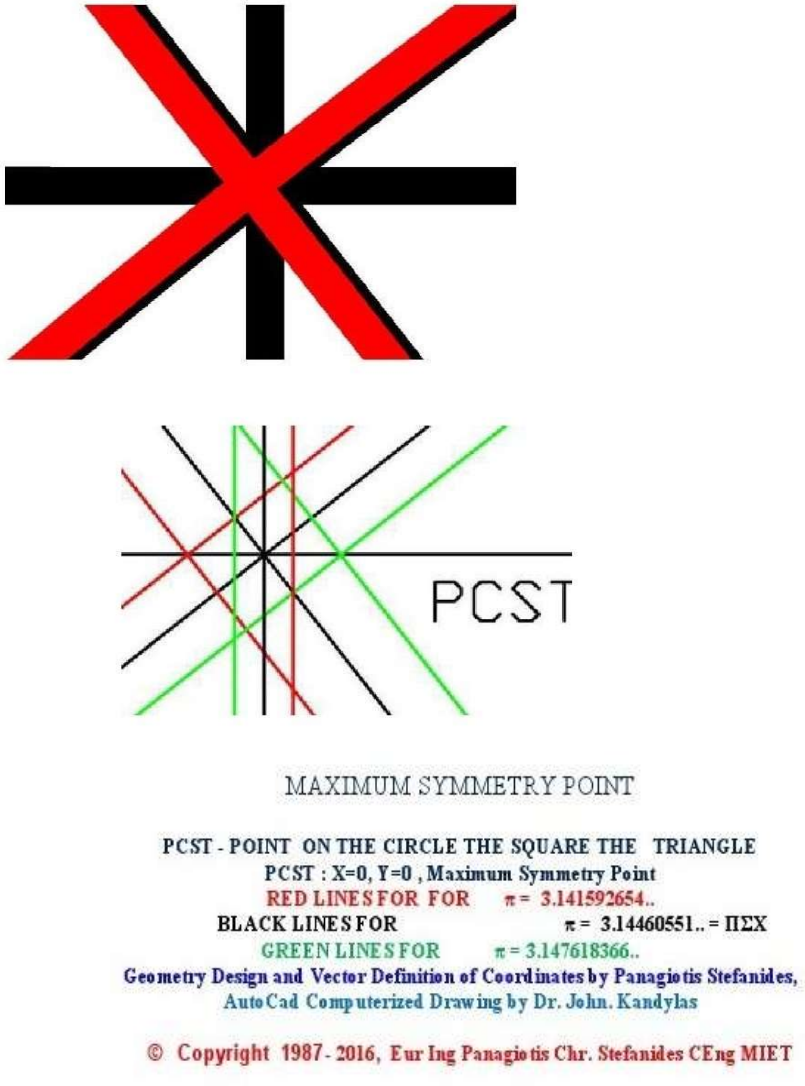
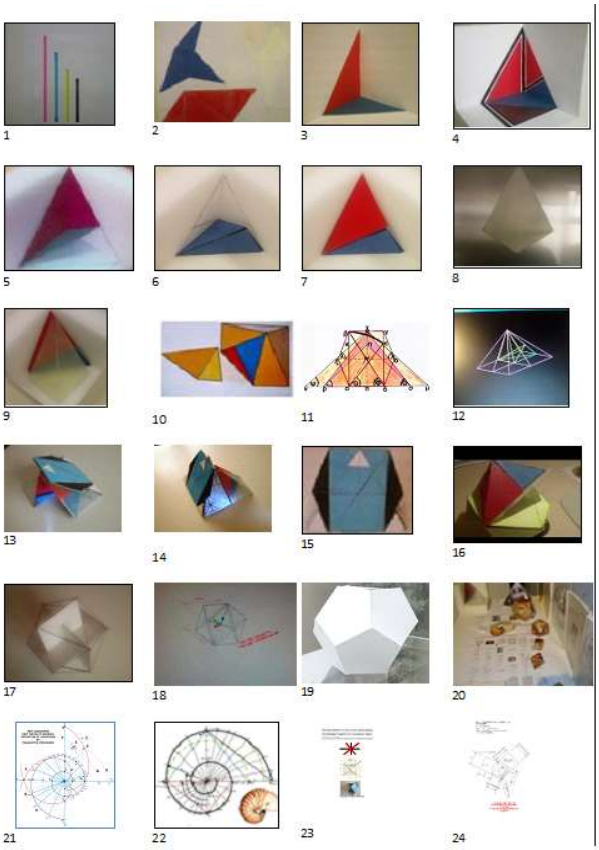


Figure 5 : *Zoom of Figure Left top corner Triple Point. Outer Circle Cuts Square and also by line of of Triangle's Hypotenuse [for π = 3.14460551..]*

Lines ,Surfaces [triangles], Volumes [solids], Nature, Human Sapiens.



https://www.linkedin.com/pulse/blocks-structuring-five-polyhedra-panagiotis-panagiotis-stefanides/

Figure 6: *Geometry for, Building Solids Based on Plato's Timaeus Interpreted "Somatoides-mass density 1 volume" (5), built by connecting areas of orthogonal scalene triangles of structures based on lines [representing Plato's 4 elements].*

[Author's anticipated proposal for possible elemental matter physical binding .

In a static, but vibrating field [aether- electromagnetic medium], conductive [massive] elemental lines with alternating bipolar charges moving in it by the action of the field , should result into alternating currents running within them. Two such lines could be contacted electrically at the ends of each line, via their + and - charges, and similarly three lines [in the correct lengths] could form triangles [orthogonal according to my theory], and in such forming a surface. Similarly by joining two pairs of such triangular forms [elecromagnetically attracted by the currents running within them] could create materialistic volumes[tetrahedra].Continuing, by these similar actions of electromagnetic forces, the joining of these materialistic volumes[tetrahedra] could result into further building blocks of matter. According to my geometric theory [pure classical geometry, based on the Square Root of the Golden Section] such materialistic volumes [tetrahedra] build a Great Pyramid Model via which the structure of the world of the 5 Platonic [or Eucleidean] solids are formed.]

4. "Generator Polyhedron" Structural Stereometry.

The Form of this Polyhedron is proposed as the Interpreted Configuration of Plato's Epinomis 981b of "*the other genus*".

https://www.linkedin.com/pulse/generator-polyhedron-platonic-eucleidean-solids-panagiotis-stefanides/

GENERATOR POLYHEDRON

Figure 7: *Polyhedron, Mirrors' Invested Constraction, Hardbord Skeleton. Currently Requested and Kept with Mathematics Department. Library Exhibit, of the University of Athens School of Sciences .*

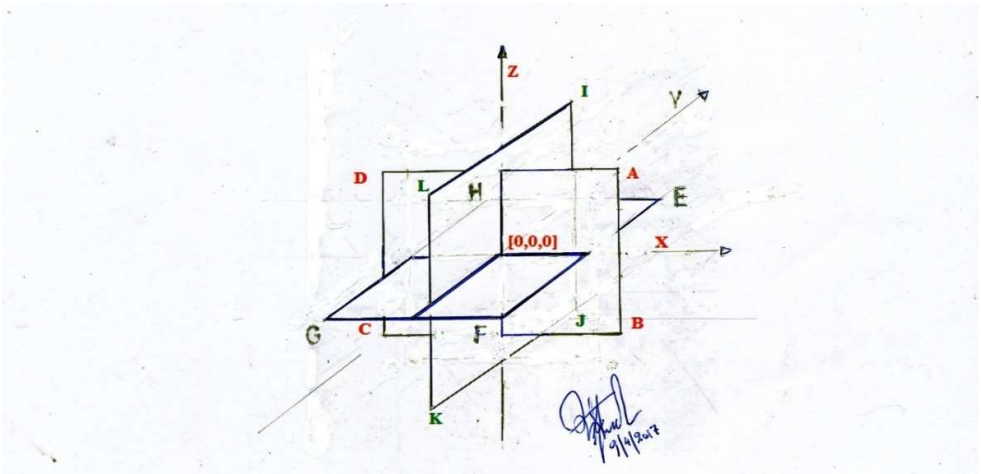


Figure 8: *Skeleton Planes' with X, Y, Z, axes of origin at [0, 0, 0]. Three Skeleton planes designed: ABCD, EFGH, IJKL, orthogonal to each other.*

AE, AF, AI, AL
BF, BK, BE, BJ
CK, CG, CH, CJ
DI, DL, DG, DH
IA, IE, ID, IH
JE, JH, JB, JC
KB, KC, KF, KG
LA, LD, LF, LG
EA, EB, EI, EJ
FA, FB, FK, FL
GK, GL, GC, GD
HC, HD, HI, HJ

Figure 9: *Skeleton Planes' vertices connections logic to form the polyhedral image.*

POLYHEDRON CONFIGURATION on X, Y, Z axes of symmetry

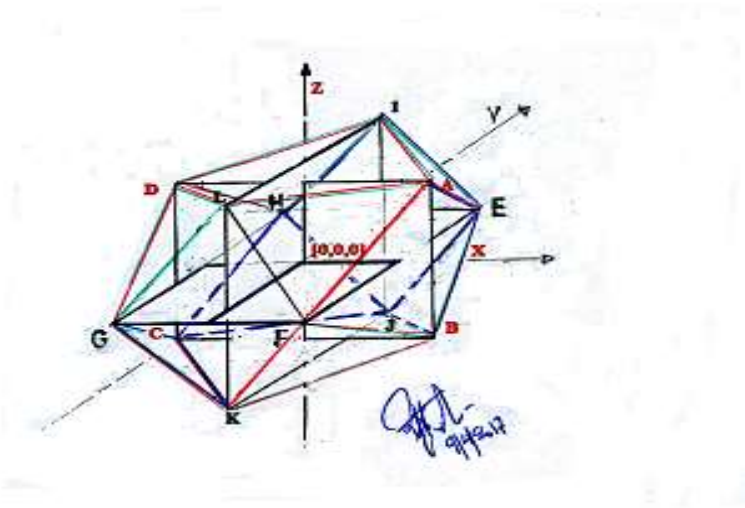
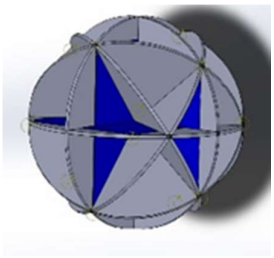


Figure 10: *Generator Polyhedron Configuration on X, Y, Z Axes.*

4a. Construction of the 7 circles Defining Polyhedral Skeleton Structure [blue].



FORM A. SET OF 3 SIMILLAR CIRCLES :

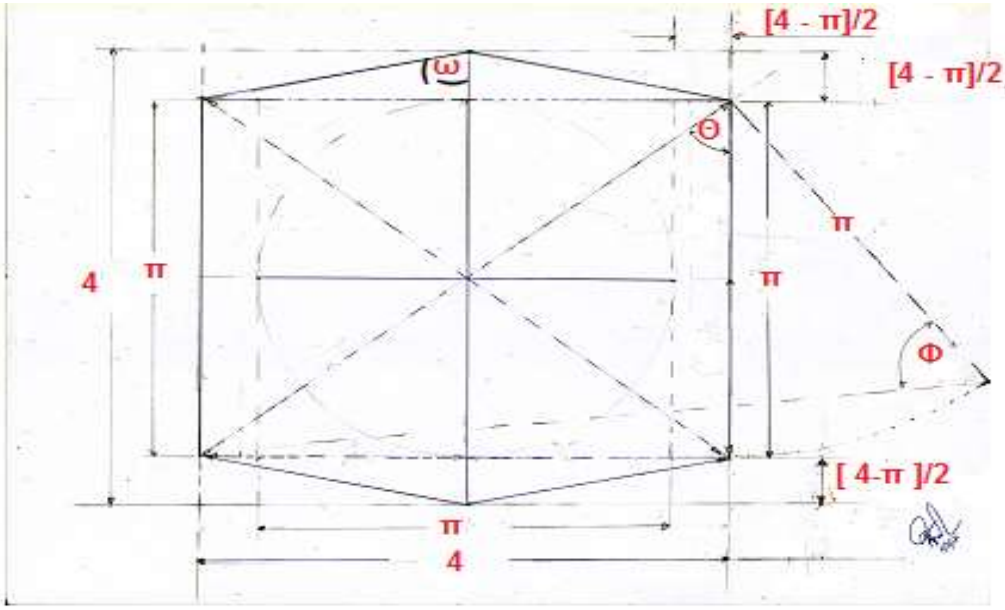
1a]. Passes Parallelogramme Vertices of ABCD
2a]. Passes Parallelogramme Vertices of EFGH
3a]. Passes Parallelogramme Vertices of IJKL

FORM B. SET OF 4 SIMILLAR CIRCLES

1b]. Passes Parallelogramme Vertices of AICK
2b]. Passes Parallelogramme Vertices of ALCH
3b]. Passes Parallelogramme Vertices of LDEB
4b]. Passes Parallelogramme Vertices of IDKB

[N.B. Three such of FORM B sets are symmetrically possible]

5. Sectional Stereometric Configurations and Calculations



INSCRIBED TO SQUARE OF PERIMETER 4π,
CIRCLE WITH CIRCUMFERENCE π^2

TAN[Θ] = 4/π, [for π= 4/T] , T = SQRT{[(SQRT(5) + 1]/2

TAN[Φ] = SQRT[4^2 + π^2]/π , [for π= 4/T]

T = 1.27201965.. , Θ=51.82729237.. deg.

π = 3.14460551.. Φ = 58.28252559.. deg.

[4 - π]/2 = 0.427697244.. for π = 4/T

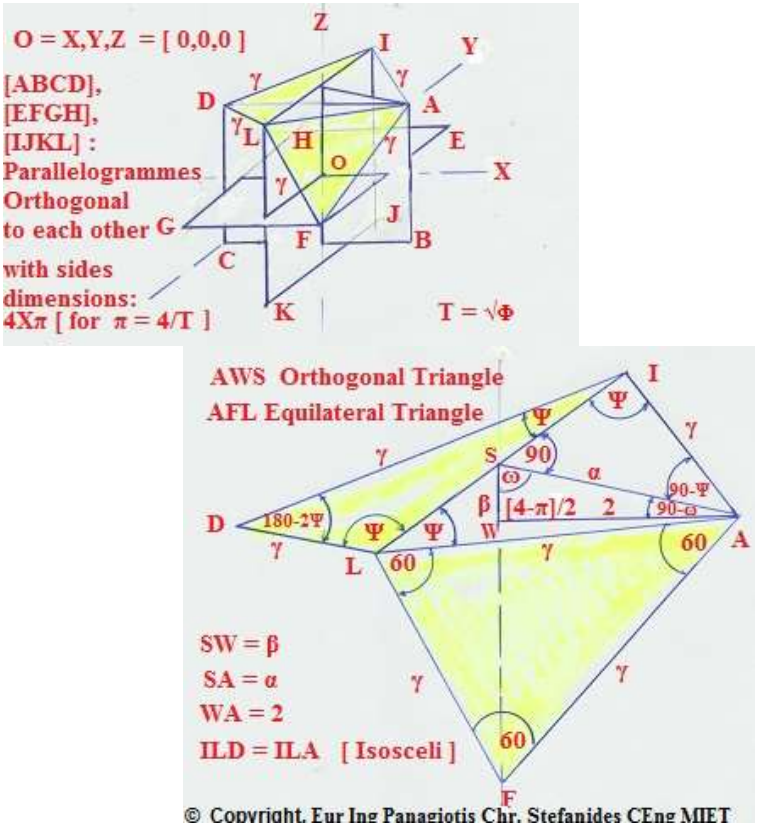
TAN [ω] = (4/2) / [4 - π] /2 = 4/ [4 - π] = 4.676205016..

ω = 77.92918912..deg., 90 - ω =12.07081088.. deg.

π/2 – [π^2]/8 =3.14460551/2 - 1.236067977 = 0.336234778
[3.14460551/2] / 0.336234778 = [π/2] / [π/2 – [π^2]/8] = 4.67620501 =
= TAN [ω]

N.B: DISCOVERY
1/Sin[54] = 1.236067977 , Angle 54 deg is found in the Pentagon of the Dodecahedron.

Figure 11: *Section of the Polyhedron*



Planes involved [ABCD] and [IJKL].
Orthogonal triangle AWS with Orthogonal angle AWS. Line AW alongside AD of plane [ABCD]. SW orthogonal to line IL of plane [IJKL].
IL = JK = AB = CD = π, IJ = KL = BC = AD = 4, LS = SI = π/2, WA = [AD]/2=4/2 =2

CONDITION THAT π =4/ { √ [{(5)+1}/2] } =4/1.27201965] = 3.14460551

a = √{ [4-π]/2]^2 + 2^2} =2.045220021
β = [4-π]/2 = 0.427697244
γ = √ [α^2+ [(π/2)^2] = 2.579740469

Tan [Ψ] = α/(π/2) =(2.045220021)/(1.572302757) = 1.300780027
Ψ = ArcTan[1.300780027] = 52.44801593
2Ψ = 104.8960319 Deg
[180 – 2Ψ] = 75.10396814 Deg

Tan [ω] = 2/ [(4-π)]/2 = 4.676205016
ω = ArcTan[4.676205016] = 77.92918912 Deg
[90 - ω] = [90 – 77.92918912] =12.07081088 Deg
2ω = 155.8583782 Deg
[180 -2ω] = 24.14162176

Figure 12: *Stereometric Calculations.*

6. Event 2017

IET INNOVATION AWARDS 2017 LONDON
Showcase and Finalist Award London 2017

Competition Finalist, Awarded "Highly Commended" in the 2017 IET Innovation Award, for the Category "NAVIGATION AND SURVEILLANCE COMMUNICATIONS", for the entry paper "Generator Polyhedron" .Top Event. Bottom Showcase exposed Photos

https://www.linkedin.com/pulse/generator-polyhedron-panagiotis-stefanides-finalist-2017-stefanides/

Figure 13: *Generator Polyhedron Finalist Award IET London 2017.*

7. Model Structures

(a) (b) (c) (d) (e) (f)

Figure 14: "Generator Polyhedron" Constructions:
(a) Skeleton PLC 3DForm SOLIDWORKS Print Structure,
(b) Paper Structure, [Scale 4X], Invested Mirror Triangles [Cuts by Lousis Co Melissia
(c) Paper Structure [Scale 2X], Invested INOX Triangles [Waterjet Cuts DIN Piraeus],
(d) PLC [Scale 2X], 3D Print [Geometry Design and Vector Co-ordinate'sDefinition,by Panagiotis Stefanides, Solidworks Computations and SOLIDWORKS Print by Eng. A. Georgostathis 3DForm Maroussi Athens].
(e) Polyhedral Skeleton AutoCad Image by Dr. Ginnis Kandylas,
Geometry and Vector Co-ordinates Definition by Panagiotis Stefanides.
(f) 3DForm Image , Simulation of Interpreted form of Plato's Timaeus 7 Circles, Soul of the World, Proposal, Geometry and Vectors' Definition by Panagiotis Stefanides.

Conclusions

Results serve as positive feedback to the paused propositions for the geometrical form i.e. the configuration of the "Generator Polyhedron" for the *genus of the soul* in Epinomis, *the soul of the world* in Timaeus *and* Republic's *Planetary System.* It is anticipated that scientists such as physicists, chemist, biologists etc. beyond mathematicians may find this work of value.

Anticipation

To the "discussions", and "navigation" instructions, during lengthy sea and oceanic seafarer's voyages, I received from my father[Capt. Mariner Chr. P. Stefanides], on the celestial bodies' "spirals", their "temporal" periodic "cyclic" motion "frequencies", when clear guiding night or sunny day skies permitted, for stellar, lunar or solar "timely measurements", and for the relevant "calculations" involved of the vessel's "position" in the sea with acceptable "errors" estimation, dependent on mathematics, "astronomical data" correctly applied, and with instrument "sextant " within acceptable "functioning condition" and "calibration", for the "reliable mile safety" accuracy limit.

References and Links.

[1]. Treatise on Circle – Generator Polyhedron
1. Harmony and Disharmony
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[2]. GOLDEN ROOT SYMMETRIES OF GEOMETRIC FORMS
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2.1. http://www.stefanides.gr/pdf/BOOK%20_GRSOGF.pdf

2.2. BOOK TRANSLATION IN CHINESE

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No: 5659 – 29 December 1997
3.1. http://www.stefanides.gr/pdf/BOOK_1997.pdf

Links

1]http://www.stefanides.gr/pdf/DIALOGO_2014_PANAGIOTIS_STEFANIDES.pdf

2]https://www.researchgate.net/publication/316667593_Treatise_on_Circle-Generator_Polyhedron_Harmony_and_Disharmony_Condition_of_Three_Concentric_Circles_in_Common_Ratio

3]https://www.researchgate.net/publication/315801180_GENERATOR_POLYHEDRON_OF_PLATONIC-EUCLEIDEAN_SOLIDS_By_Panagiotis_Stefanides_1A

4] https://www.linkedin.com/pulse/treatise-circle-harmony-disharmony-condition-3-common-stefanides

5]https://www.researchgate.net/publication/316582864_IMPORTANT_DISCOVERY_-_PENTAGON_STRUCTURE_-RULER_AND_COMPASS-By_P_Stefanides

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7]https://www.researchgate.net/publication/292775110_EXHIBITION_OF_MATHEMATICAL_ART_JMM16_by_Panagiotis_Stefanides

8]https://www.youtube.com/watch?v=XeOjPmKSsOI&feature=em-upload_owner

9]http://remacle.org/bloodwolf/philosophes/platon/cousin/epinomisgrec.htm

10]http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0179%3Atext%3DEpin.%3Apage%3D981

11] Presentation By P.C.STEFANIDES 25/06/ 2018 [UA]

12] First Congress of Greek Mathematicians
FCGM University of Athens 2018

13]. Paper Presentation by Panagiotis Stfanides

FCGM 2018 Athens University [2018].

(CV) Resume

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□□[2002] Member of the IEE[IET] ,
□□[1997] Certified Lead Auditor [Cranfield University],
□□[1977] Member of the Technical Chamber of Greece TEE,
□□[1975] Electrical and Mechanical Engineer of the Technical University of Athens,
□□[1974] Electrical Engineer of the University of London .
Professional Experience:
30 Jun 2010-1978 [HAI]
□□Electromagnetic Compatibility, Head of Standards and Certification, EMC Hellas SA, Affiliate of HELLENIC AEROSPACE HAI,
□□Research and Development,Lead Engineer, of the Electronic Systems Tests and Certification,
□□Engineering Quality and Reliability Section, Lead Engineer, and HAI's Quality System Lead Auditor,
□□Engines' Directorate Superintendent, Managed the Engineering Methods Division of the M53P2 Engine Nozzle Manufacturing, of the SNECMA- HAI Coproduction [
Module 10] M53 P2 Programme, MANAGED the Engineering Methods Section.
□□Engines' Tests and Accessories Superintendent,
□□Engines' Electrical Accessories Supervisor.
1978-1974
□□G.E. Athens Representatives, Sales Engineer / Assistant Manager,
□□Continental Electronics Dallas Texas, and EDOK-ETER Consortium Engineer, of a 2MW Superpower Transmitters'
Installation Programme, in Saudi Arabia,
□□Chandris Shipyards Engineer and Vessel repairs Superintendent, Salamis Island.

Training:

Public Power Corporation [GR], Sizewell Nuclear Power Station [UK], Oceangoing Steamship [S/S Chelatros] and Motor Vessels' Navigation [Celestial, Radio,
Coastal under Instructions of Capt. Mariner Chr. P. Stefanides] and Engines', of "Kassos" Shipping Co. Ltd. [R&K London].

Awards- Presentations - Publications

Award: Archimedes Silver Medal for the Invention of a Solar Locating and Tracking System