Unit Parabola Duo Curve Analytics

A Sand Box Geometry Exploratory

Using a Unit Parabola curve Analytics

June 22
2019

Parametric Geometry utility of a unit parabola focal radius can be construed as a useful tool when exploring curves. Both artificial and Natural. 21st century mathematics has a plethora of manufactured curves to play with, while Natural Mechanical Energy Curves seem to be happy with two curves from antiquity. These two curves are used to describe the G-field connection happening between M1 & M2. A circle works as holding pen for curvature, the Gfield inverse square phenomena used by Sir Isaac Newton. A parabola is used by Galileo to aquire the knowledge of constant acceleration and falling. The difference? One frame of reference is constant acceleration and the other frame of reference is changing acceleration. Both belong to the art of Classical Mechanics. Their combined parametric geometry provides means to construct and analyze Natural Mechanical Energy Space Curves.

Constructing and reading Natural mechanical energy curves with a Sand Box Geometry CSDA

ALΣXANDΣR; CEO SAND BOX GEOMETRY LLC

ON THE UNIT PARABOLA METER OF CENTRAL FORCE ENERGY CURVES

Radii of circles are the principal meter of curvature. Differential Calculus will use curve framing to measure changing curvature of a curves loci with constantly changing radii of an "osculating" circle. Curve framing, a tangent to and tangent normal with a considered point on a curve, will hold the radius of an osculating circle coincident with the tangent normal of the frame. This tangent normal will connect center of the osculating circle with the original point on the curve, presenting an osculating radius of measure, allowing differential curve analytics meter of changing curvature enjoyed by a moving point. A parabola curve provides two comparatives; one reflecting changing magnitude of curvature and the other providing radius of curvature following moving points on selected loci of curves, Natural and manufactured.

Manufactured osculating centers also moves as the point moves from initial place on the curve to final place on the curve. Initial "center" will sketch a new curve to final "center" called an evolute. Suppose Inverse square energy curves *deny* physical relocation of a central force point mass **F**, which after all is center to the field, and thereby will forbid a moving change unless acted upon by another central force? If the center of a central force is fixed, we need a method to trace changing curvature of stable orbit loci that doesn't also move the sun to accommodate osculating radii.

CURVE ANALYTICS OF A UNIT PARABOLA

Parabolas are Dependent Energy Curves and enjoy fixed center analytics curve sketching describing changing displacement radii of M_2 from a fixed M_1 as changing energy level of M_2 orbit motion.

Changing position vector magnitudes displayed by Natural orbit event curves can be measured with changing radii energy $\left(f(r)\right)$ of a dependent curve unit parabola focal radius, metered from **F** to the M_2 event considered.

In fact, the focal radius of **F** as a fixed center end-point, plays a significant role in determining differential curvature of (manufactured) position (r) on the parabola loci as well as M_2 operating energy $\left(f(r)\right)$ of an orbit period event.

Every parabola focal radius has an identity for finding orbit energy curves. The essentials of this identity are the parabola vertex radius of curvature being congruent with the independent curve g-field spin diameter, bringing a mechanical congruence to the initial parabola focal radius and the $\left(\frac{\pi}{2}\right)$ direction spin radius. Radii of curvature of every parabola vertex is 2*p,* the diameter of the independent potential curve. The principal event curve of system Gfield motive energy is (2p), not the potential curve diameter but the positive parabola focal radius latus rectum. A CSDA system Latus Rectum represents average energy and average orbit diameter of M_2. Equation (1) uses system focal magnitude of a **CSDA** to meter curved space position energy/curvature .

$$1. (vertexradiusofcurvature) \times (focalradius) \times \left(\sqrt{focalradius \times \frac{1}{r}}\right) = \left[\frac{|f''(r)|}{\left(1 + \left(f'(r)\right)^2\right)^{\frac{3}{2}}}\right]^{-1}$$

F and its focal radii are the plane geometry meter of spherical energy curves.

Step 1 will be central relative analytics of a focal radius (position vector magnitude). Every parabola vertex radius of curvature is: $(2p)$. To find focal radius magnitude on manufactured curves subtract $\left(f(r)\right)\ from\ (2p)$. The same method serves well Natural Energy Curves:

1. Focal radii/position vector magnitude: $(2p) - \left(f(r)\right)$.

Step 2 will be means to determine parabola loci radii of curvature. Radius of curvature for all parabola loci:

2. $\left(2p \times focalradius \times \sqrt{focalradius \times \frac{1}{r}}\right)$; important, every CSDA $(r = p)$.

$$\text{ParametricPlot}[\{\{1\text{Cos}[t],1\text{Sin}[t]\},\{t,\frac{t^2}{-4}+1\},\{t,\frac{t^2}{+4}-1\},\{1,t\},$$
$$\{2,t\},\{3,t\}\},\{t,-1,3\},\text{PlotRange}\rightarrow\{\{-1,3\},\{-1,2\}\}]$$

Using Euclid to separate space into two infinities

Let the unit circle be discovery curve and the unit parabola definition curve. If we set definition curve latus rectum at unit two of our square space number line; we have a curved space construction of two infinities, kept apart by a unit circumference, micro for curvature and macro for radii of curvature.

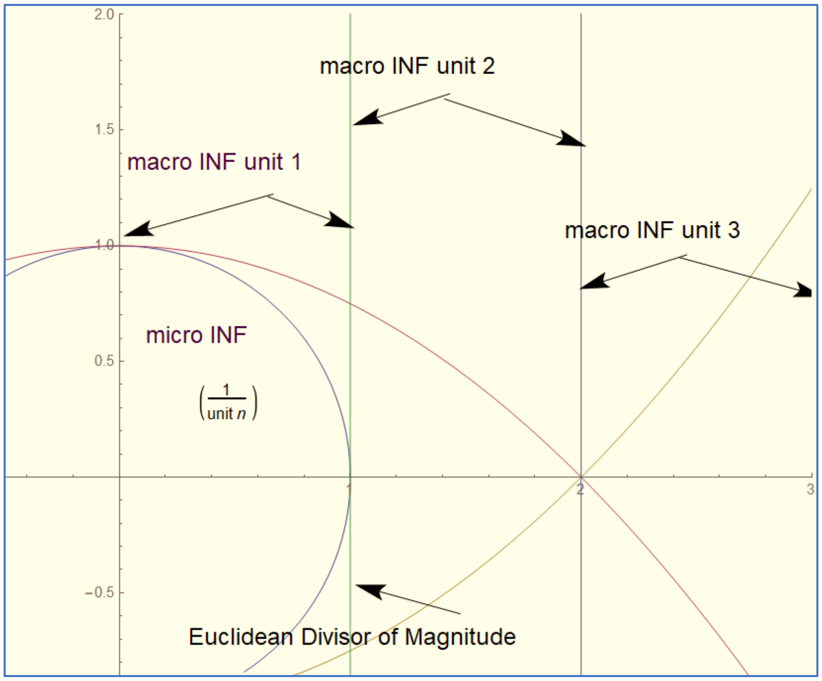


Figure 1: Euclid’s divisor provides radii of discovery. Two need be average energy of orbit; positive energy on time curve to perihelion and negative energy to aphelion.

Next, establish three-point loci on a CSDA definition curve using GeoGebra. I will determine position vector magnitude and loci curvature using CSDA identities 1&2.

1. $focal\ radius\ at\ (1,3/4)\ =\ [2-3/4=5/4].$ using (1)
2. $focal\ radius\ at\ (2,0)\ =\ [2-0\ =\ 2].$ using (1)
3. $focal\ radius\ at\ (3,-5/4)\ =\ [2-(-5/4)\ =\ 13/4].$ using (1)

Methods to conduct curve analysis of analytic geometry point composition.

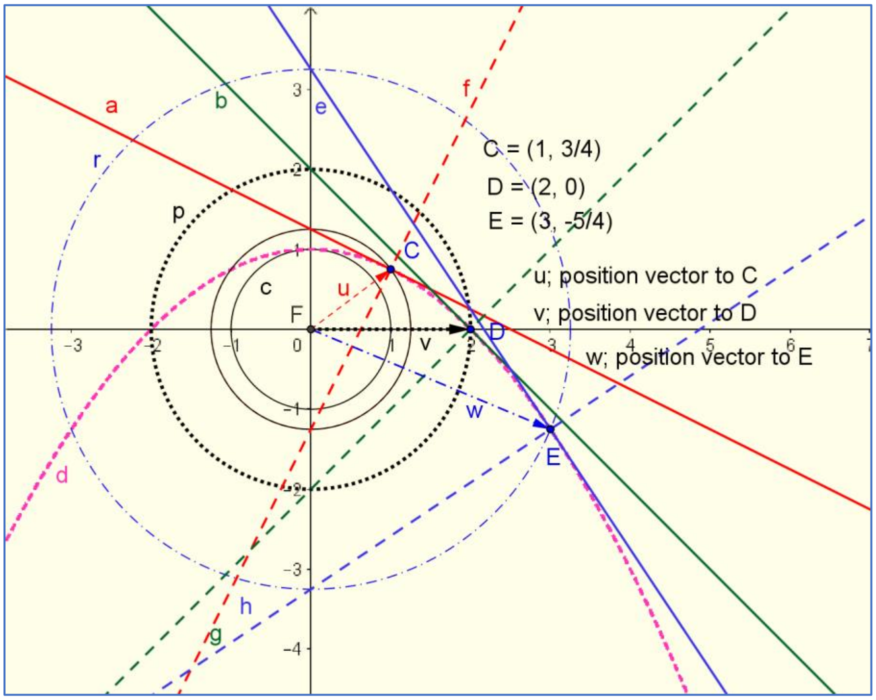


Figure 2: CSDA M_2 energy curve analytics is done with position vectors (u, v, and w) with respect to **F**.

- Conduct curve frame discovery (tangent & tangent normal) of curvature for unit parabola (d) about unit circle (c) at parabola loci points (C, D, and E).
- Construct tangents (a, b, and e) for points (C, D, and E).
- The differential geometry radius of definition for curvature evaluation of each point lies on the tangent normal (f, g, and h)

The method to evaluate curvature of a point will be found in any first-year calculus text book. Let (κ) be the curvature of a point on our parabola loci; then:

3.
$$k = \frac{|2nd derivative|}{(1 + (first derivative)^2)^{\frac{3}{2}}}$$

In plain language the above term refers to a fraction. The numerator is an absolute value of the second derivative. The denominator refers to a sum (1+the first derivative squared) raised to the 3/2 power. If we only worked with circles, which I intend to do, this entire operation means curvature of a circle would be the inverse of its radius.

circle	Radius in units	curvature
A	2	$\frac{1}{2}$
B	$\frac{1}{2}$	2
C	3	$\frac{1}{3}$
D	$\frac{1}{3}$	3

Curvature is a number only. Radius is magnitude and controls size of curvature. I will use a *Mathematica* template to demonstrate the following identity of a parabola focal radius at locus position $(1, ¾), (2, 0), \left(3, \frac{-5}{4}\right)$.

using equation (3) to determine curvature at (C, D, E).

$$\text{point C } (1, \frac{3}{4}) \xrightarrow{\text{yields}} \frac{\text{Abs}[\frac{-1}{2}]}{(1 + (\frac{t}{-2})^2)^{\frac{3}{2}}} /. t \to 1 \xrightarrow{yields} \frac{4}{5\sqrt{5}}$$

$$\text{point D } (2,0) \xrightarrow{\text{yields}} \frac{\text{Abs}[\frac{-1}{2}]}{(1 + (\frac{t}{-2})^2)^{\frac{3}{2}}} /. t \to 2 \xrightarrow{yields} \frac{1}{4\sqrt{2}}$$

$$\text{point E } (3, \frac{-5}{4}) \xrightarrow{\text{yields}} \frac{\text{Abs}[\frac{-1}{2}]}{(1 + (\frac{t}{-2})^2)^{\frac{3}{2}}} /. t \to 3 \xrightarrow{yields} \frac{4}{13\sqrt{13}}$$

These evaluations are curvature only and must be inversed to find radius of curvature. Using a Sand Box Geometry **CSDA** focal radius gives us a radius of curvature magnitude directly. This next table assembles comparative data. Then we can move to a Geogebra demonstration on unit circle central force F energy propogation on a unit parabola central relative time diagonal.

All parabola *vertex* radii of curvature are $(2p;\ where\ p = r)$ of the unit circle.

1. Focal/position magnitude: $(2p) - (f(r))$.

1, focal radius at $(1, 3/4) = [2 - 3/4 = 5/4]$.	using (1)
2. focal radius at $(2,0) = [2 - 0 = 2]$.	using (1)
3. focal radius at $(3, -5/4) = [2 - (-5/4) = 13/4]$.	using (1)

Focal radii identity to find loci radii of curvature.

$$point\ C\ \left(1, \frac{3}{4}\right) \xrightarrow{yields} \left(2 * \frac{5}{4} * \sqrt{\frac{5}{4}}\right) \xrightarrow{\text{yields}} \frac{5\sqrt{5}}{4}$$

$$point\ D\ (2, 0) \xrightarrow{yields} (2 * 2 * \sqrt{2}) \xrightarrow{yields} 4\sqrt{2}$$

$$point\ E\ (3, \frac{-5}{4}) \xrightarrow{yields} \left(2 * \frac{13}{4} * \sqrt{\frac{13}{4}}\right) \xrightarrow{yields} \frac{13\sqrt{13}}{4}$$

A changing focal radius of a unit parabola is one and the same as changing central force motive radii, following changing motion on a time curve with respect to energy propogation sourced from a central force at unit circle center. I will show the parabola loci tracks changing curvature of iterate circle/energy-spheres with a Geogebra construction.

CHANGING FOCAL RADII ARE ENERGY CURVES.

If we let (C & E) be period limits of M_2 orbit motion, we see that focal radii grow outward from the central force F of the unit circle as *initial* curvature of consideration (perihelion) toward radii of *final* concentric curvature of consideration (aphelion). In the **CSDA**; focal radius (u) points to a right-angle vertex of curve framing for position analysis of differential geometry at point C *and* also defines a right triangle rotation diameter of an energy curve for M_2 in our physical world. Let these position vectors display expanding central relative spherical energy wave forms passing through C as initial enegy curve.

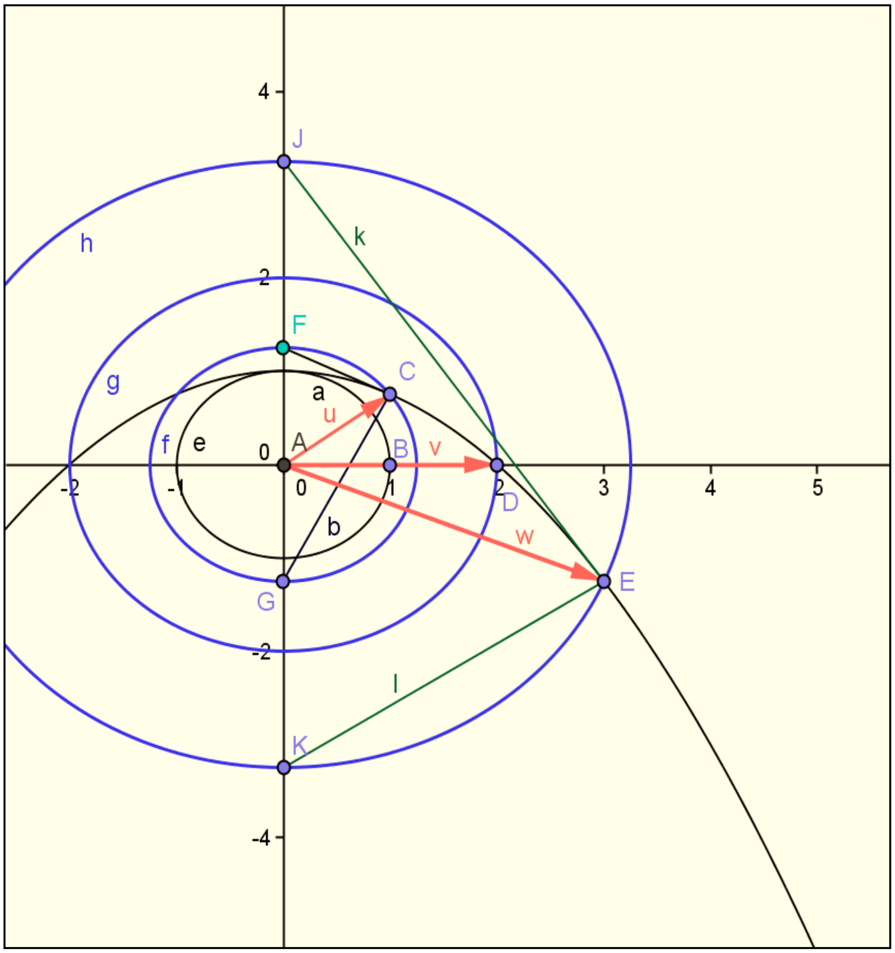


Figure 3: CSDA construction of stable M_1M_2 orbit configuration. High, low energy limits and average energy diameter of stable orbit system.

Let focal radius (v) point to D as average energy diameter of M_1M_2 system, and let focal radius (w) point to E as energy limit aphelion.

The unit circle center point (0) does have a dual identity. One is traditional central position of a Cartesian coordinate system square space (zero). The other identity will animate curved space phenomena of a Sand Box Geometry **CSDA** when we allow a system center (0) to become **F** of a natural central force. Be it a stone tossed in water or expanding energy of a super nova, a focal radius will follow moving expanding energy curves.

CONSIDERATION ONE: THE PRINCIPAL OF CENTRAL FORCE FIELD SYMMETRY. THE CLASSIC GEOMETRY FRAME OF REFERENCE DEPICTING EFFECTIVE PLANETARY MOTION BY THE THREE-SPACE GRAVITY FIELD CURVE OF OUR SUN IS A NATURAL FUNCTION EXHIBITED AS A DOUBLE CURVE STRUCTURE HAVING ONE AND ONLY ONE FOCUS AND CENTER. LET [**F**] BE CENTER OF OUR CENTRAL FORCE SYSTEM. THEN, THE INDEPENDENT CURVE HAS ONE CENTER [**F**] AND IS THE SPHERICAL LOCUS OF AN [**ASI**]. THE DEPENDENT CURVE HAS ONE FOCUS [**F**] AND IS THE PROFILE PARABOLA GENERATING CURVE OF A FIELD RELATIVE TANGENT [**RT**].

Reference Frame Postulate One: A cross section of the three-space field compound surface curve, containing the spin axis, is a two-space interior map of two acceleration curves. This map is congruent everywhere with and indistinguishable from, any other cross section map containing the field spin axis. Such a map is a g-field Central Force (**CSDA**).

Reference Frame Postulate Two: The principal axis is the field spin axis produced having three natural points. These points are the system center (**F**), the vertex of rotation being **North**, and the vertex of rotation being **South**.

In the study of field accelerations, I found only the two previously explored systems. Constant acceleration of Galileo and changing accelerations of Sir Isaac Newton. Since both would seem to operate in particular order and control of space; I give definition of what space belongs to g-field potential and what space is to be controlled by potential.

CONSIDERATION 2: ON CURVED SPACE: THE CLASSIC GEOMETRY FRAME OF REFERENCE DIVIDES FIELD ACCELERATION PHENOMENA CURVING OUR SPACE INTO TWO PROPERTIES.

1. SQUARE SPACE: ALL SQUARE SPACE GRAVITY FIELD MOTIVE ENERGY CURVES SHALL SOURCE FROM F. DISPLACED POSITION (r) FROM F IS KNOWN AS INVERSE SQUARE OPERATING DISPLACEMENT RADII OF A CENTRAL FORCE SYSTEM. WHERE F IS CENTER OF A PRINCIPAL (ASI) POTENTIAL CURVE HAVING COMPLETE CONTROL OF A CENTRAL FORCE ACCRETION DIAMETER; (aka focal diameter Latus Rectum of the system).

2. CURVED SPACE: A CURVED SPACE RELATIVE ENERGY TANGENT (RT), TRACED BY POSITION VECTORS of CENTRAL FORCE (F), PROPOGATE SPHERICAL ENERGY CURVES WITH RESPECT TO TIME, AND CAN BE USED TO MAP AND METER INTERIOR ACCELERATION PHENOMENA OF 3-SPACE ENERGY CURVES). Cruzer; CSDA Parametric Geometry; differential Geometry curvature evaluation

Three-dimensional acceleration curves are a surface. We are stuck to the surface acceleration curve of earth. Earth is our PRINCIPAL ASI. Our moon is not attached to the PRINCIPAL ASI curve of earth, but has sufficient kinetic energy of motion to stay in orbit about our earth. I study such field motion of stable orbit exhibited by our moon using DEFINITIVE ASI. DEFINITIVE ASI are acceleration surface curves removed from **F** and shaped by curved space focal radii/position vectors. A three-space surface, when symmetric with a central force spin axis containing the focal center of the generating curve producing that surface, can be analyzed by study of its two-space profile. For the two-space curve is the interior form constructing the three-space surface, and will produce the three-space surface when rotated about the principal/spin axis. Such congruent symmetry of center can be used to visualize a cross-section map of a gravity field orbital. Once we have the profile of the field, we have a cental relative frame of reference for observed mechanics of gravity field space.

FIELD SPACETHEOREM 1: EVERY POINT AROUND THE PRINCIPAL ASI ACCELERATION CURVE OF POINT MASS [**F**] STRUCTURING A GRAVITY FIELD ORBITAL IS A <u>POSITION VECTOR</u> OF [**F**].

This theorem is self-evident. A position vector is an origin vector and [**F]** is Newtonian center. The center [**F]** has a straight line through space connecting any point unto its influence. Such a straight line makes any point in the space occupied by [**F]**, a radial displacement from [**F]**.

FIELD SPACE THEOREM 2: THE ACCELERATION EXPERIENCE OF ANY POSITION VECTOR OF [**F**] VARIES DIRECTLY AS THE SQUARE OF CURVATURE.

This theorem assigns the magnitude of the position vector as the radius of definition for inverse square experience, essentially the square of curvature. Acceleration experience is derived from Sir Isaac Newton's Universal Law of Gravity.

FIELD SPACE THEOREM 3: EVERY POINT SURROUNDING THE *SURFACE ACCELERATION CURVE* OF [**F**] AND ITS *PRINCIPAL* **ASI**, IS A MEMBER OF A SUB-SET OF POINTS HAVING EQUAL ACCELERATION EXPERIENCE. THIS SUB-SET OF POINTS WILL FORM A LOCUS DEFINING A SPHERICAL SURFACE OF CONSTANT ACCELERATION INFLUENCE KNOWN AS *DEFINITIVE* **ASI** STRUCTURED ABOUT [**F**] AND ITS *PRINCIPAL* **ASI**.

Constructing an (**ASI)**: Since any position vector is essentially a radius from [**F**] by Field Space Theorem 1, this radius can be used to define a semi-circle on the spin axis with [**F**] as center. The revolution of this semi-circle will produce the spherical surface required of an (*DEFINITIVE* **ASI)** to meter *constant* acceleration sampling of all curves constructed around the PRINCIPAL ASI of [**F**]

INDEPENDENT GRAVITY CURVES: ACCELERATED SPHERE OF INFLUENCE, THE A.S.I.

The concept of an **ASI** is based on Field Space; Theorem 3. Any point in the field space is a radial displacement from **F**, and is the radius of definition in the inverse square field expression defining force of acceleration experience. This one point as a position vector is a member of an infinite sub set of position vectors all sharing equivalent displacement (and equivalent acceleration experience) from Newtonian Center. Each position vector member of this set is a part of a locus defining a spherical surface of points in the space occupied by **F**. An **ASI** is the foundation of an orbital reference frame. An **ASI** is to field space, what a straight-line segment is to plane geometry. A basis to measure inverse square magnitude of position curvature.

If one **ASI** is a base of field measure, displacement in field space is the comparative of two **ASI's**. I intend to use two **ASI**'s as "bookend" limits of orbit period. Since acceleration changes **K.E.** of orbit, there is a sense of intensity with the descriptive utility of **ASI** acceleration experience. The highest intensity **ASI** is always the closest to **F**, holding greater **K.E.** of orbit limit, and the **ASI** of lower intensity is always the more distant, recording the lesser **K.E.** of orbit limit. All **ASI** found between the orbit energy limits of perihelion and aphelion are **DEFINITIVE ASI**, recording changing spherical energy shape of an orbit curve.

The **PRINCIPAL ASI** is the independent spherical composition of constant acceleration structuring the gravity field orbital. The radius of the independent **PRINCIPAL ASI** [*r*] is equal to [*p*] of its construct dependent unit parabola. Having parabola (*p*) = to unit circle (*r*) will not only control parabola vertex curvature for any volume of space and magnitude, but also maintain a proportional relativity assigning the Latus Rectum (4 [*p* or *r*]) as the system rotating accretion diameter where average energy and curvature for stable orbit of our planet group will be found. Focal radii definition of energy limits of motion on the paraboloid curvature of the **RT** is time sensitive and has arc length (period/2) between energy limits perihelion and aphelion.

SUMMARY OF DEPENDENT CSDA FOCAL RADII

Focal radii of **F** can be used to analyze changing energy curves of orbit motion. Focal radii are position vectors of **F** and point to orbit location on the field time curve. Focal radii end-point composing stable orbit motion on the time curve are composed with three-unit vectors of Frenet.

- Velocity and direction; into the paper.
- A unit vector pointing at acceleration sourced from **F**.
- Torque; the mechanics shaping energy of period motion.

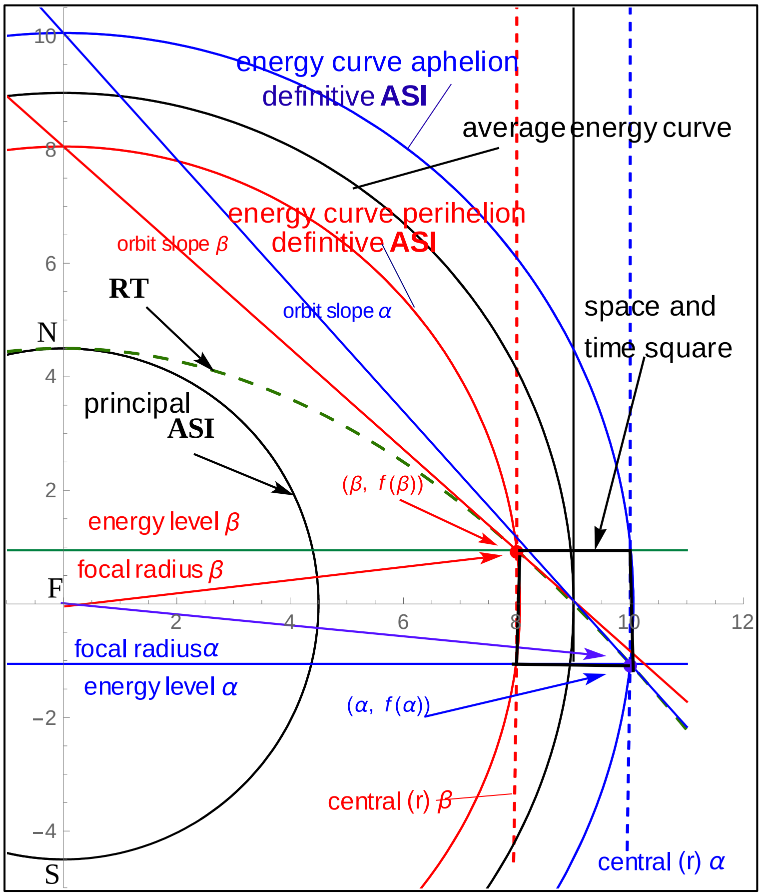


Figure 4: let system principal ASI be M_1 potential. All orbit energy curves on period time diagonal are CSDA definitive ASI.

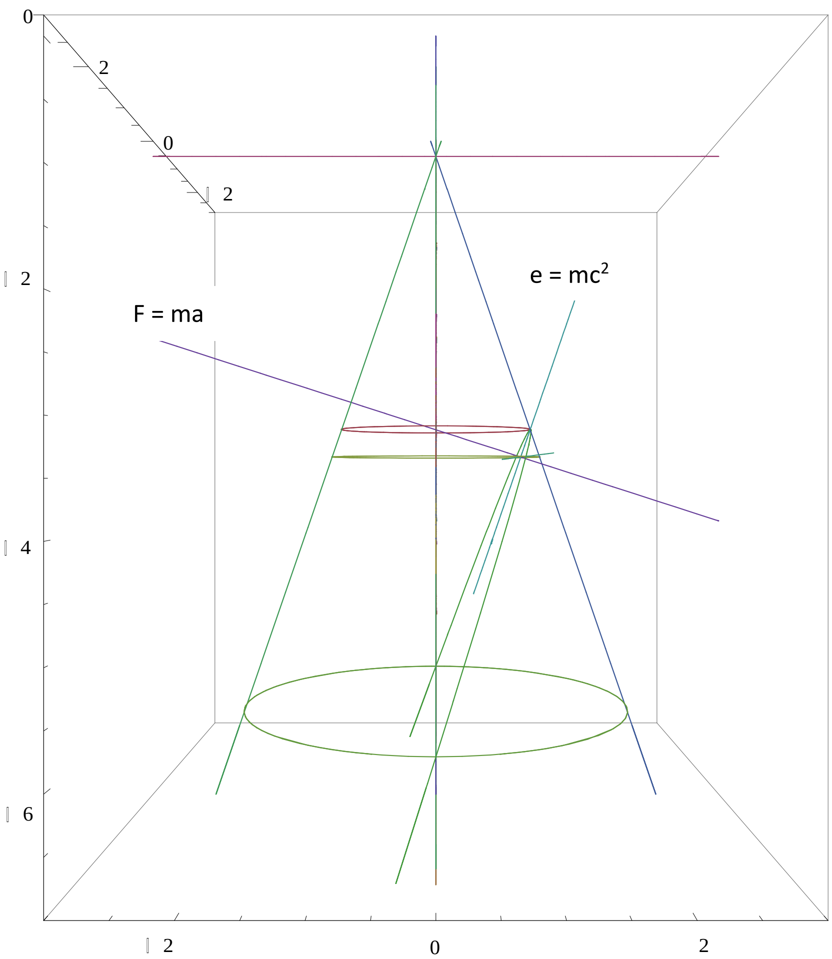
Constructing a Space and Time Square.

A space-time square can be framed using period position limits and position energy limits.

TWO PHILOSOPHICAL EQUATIONS DESCRIBING CENTRAL FORCE SCULPTING INSTRUMENTS:

($F = ma$) and ($e = mc^2$); one is the brute force of a wrecking ball crashing into the side of a condemned building. The other is the warmth of sunlight felt upon your face at the start of a beautiful spring morning, as well as the perpetual, life giving, nuclear conflagration within the center of our sun.

SBG Company Icon (fall; 2012): These are, in my opinion, the two most important philosophical equations of our physical being. Everyone is familiar (I claim familiarity *not* understanding) with ($e=mc^2$).



It's Sir Isaac Newton's ($F=ma$) that gives us our 21st century life style. They meet at the Apollonian section focus of a cone. I use this inspiring meeting of human thought to pursue a *Unified Field Geometry*. A plane geometry exploration of natural forces shaping fields.

- Electromagnetic.
- Gravity (I have completed a plane parametric geometry exploration of this field as of 8/2012).
- Strong and Weak nuclear. I don't pursue or understand the math of Unified Field Theory; with God's help I imagine the geometry of forces shaping lines and curves of His Creation.

COPYRIGHT ORIGINAL GEOMETRY BY

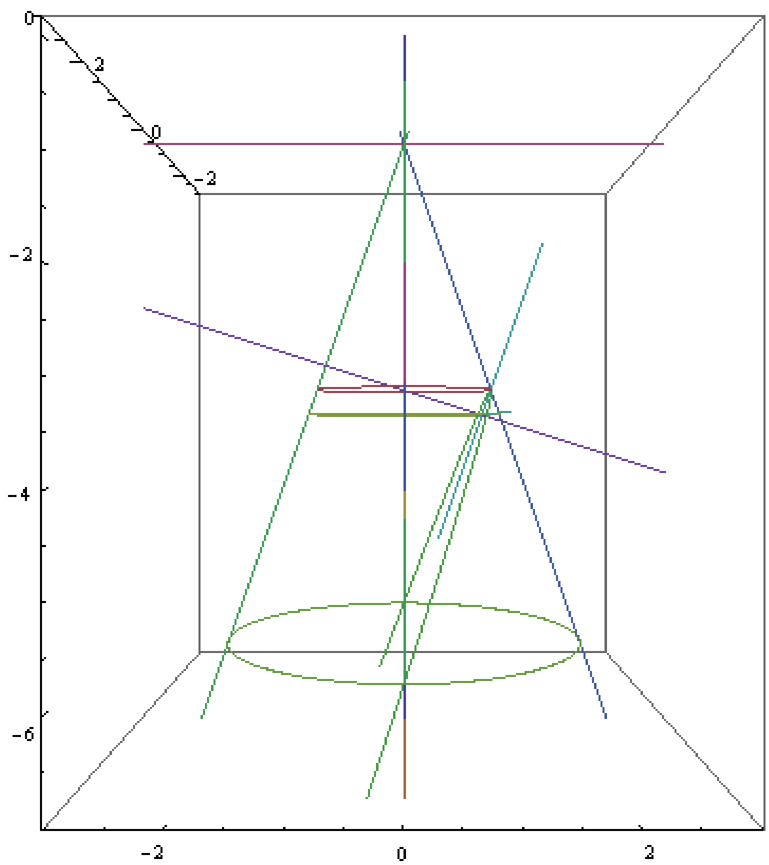
Sand Box Geometry LLC, a company dedicated to utility of Ancient Greek Geometry in pursuing exploration and discovery of Central Force Field Curves.

alexander@sandboxgeometry.com
end page 2012

God Bless, and *make* our world safe. Alexander.

ALΣXANDΣR; CEO SAND BOX GEOMETRY LLCCOPYRIGHT ORIGINAL GEOMETRY BY Sand Box Geometry LLC, a company dedicated to utility of Ancient Greek Geometry in pursuing exploration and discovery of Central Force Field Curves.

Using computer parametric geometry code to construct the focus of an Apollonian parabola section within a right cone.

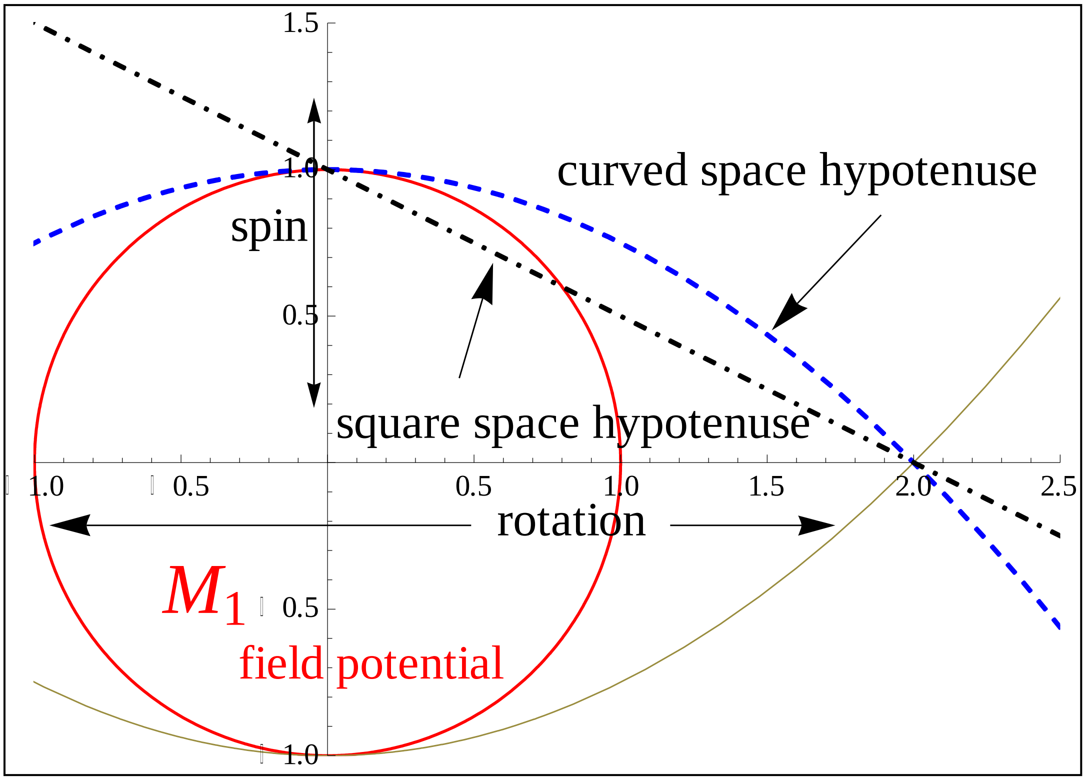


"It is remarkable that the directrix does not appear at all in Apollonius great treatise on conics. The focal properties of the central conics are given by Apollonius, but the foci are obtained in a different way, without any reference to the directrix; the focus of the parabola does not appear at all... Sir Thomas Heath: "A HISTORY OF GREEK MATHEMATICS" page 119, book II.

The computer is my sandbox, the unit circle my compass, and the focal radius of the unit parabola my straight edge.

ALΣXANDΣR; CEO SAND BOX GEOMETRY LLC

The square space hypotenuse of Pythagoras is the secant connecting (π/2) spin radius (0, 1) with accretion point (2, 0). I will use the curved space hypotenuse, also connecting spin radius (π/2) with accretion point (2, 0), to analyze g-field mechanical energy curves.



CSDA demonstration of a curved space hypotenuse and a square space hypotenuse together.

We have two curved space hypotenuses because the gravity field is a symmetrical central force and will have an energy curve at the **N** pole and one at the **S** pole of spin; just as a bar magnet. When exploring changing acceleration energy curves of M_2 orbits, we will use the N curve as our planet group approaches high energy perihelion on the north time/energy curve.

ALΣXANDΣR; CEO SAND BOX GEOMETRY LLC

SANDBOX GEOMETRY WEB SITES:

1. (sandboxgeometry.com) Oldest site, untouched since inception by Betsy Labelle; 1^{st} Q 2011 (no longer web master).
2. (sandboxgeometry.info) my Blog/Diary.
3. (sandboxgeometry.org) Dated record of abstract presentation. A learning curve so to speak; about CSDA development.
4. (sandboxgeometry.net) unused.