A 3D Geometry of complex cycle varieties: A Unified Framework for the Riemann Hypothesis and the BSD Conjecture

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Abstract

This paper presents a unified geometric framework for the Riemann Hypothesis and the Birch and Swinnerton-Dyer (BSD) Conjecture through the construction of a 3D compression Real-space vs 3D stretched complex-space algebraic cycle system governed by orthogonal cycles. We demonstrate that the 3D geometric algebraic cycle $y = x^{2n} + m$ and $y = z^{2n} + m$ undergo a 180° mirror inversion of 3D geometric real algebraic cycle to be 3D geometric complex algebraic cycle, as they transition from 3D real-space compression to 3D complex-space stretching. By analyzing the system in the infinite limit ($n \to \infty$), we identify a "The 3D geometric stability" where geometric stability is achieved only when the 3D real scalar anchor $2m$ matches the 3D complex operator I. This stability condition necessitates $m = 1/2$, providing a topological basis for the critical line in the Zeta function and the analytic synchronization at $s = 1$ in L-functions. Our findings suggest that these long-standing conjectures are consequences of the fundamental requirement for symmetry and geometric stability within 3D geometric manifolds,we show that the 1/2 critical line is a necessary **stability axis** where complex vibrations turn into real numbers. By linking the height of Zeta zeros to the rank of mathematical varieties(or we may link the height of central zeros to the prime of mathematical varieties, if we can find central zeros), we find a **Prime-Rational Bridge** governed by a simple scaling ratio of $\sqrt{2}$. Our proof demonstrates that as these values grow, they align perfectly with zeta zeros a 1/2 and central zeros 1 phase shifts. This suggests that prime numbers and rational ranks are just two different views of the same **symmetrical manifold**, providing a unified geometric solution to both conjectures.

Keywords: Orthoconvergence, 4D Manifold, Mirror Inversion, Phase Synchronization, Unit Alignment, Geometric Equilibrium, The Riemann Hypothesis(RH), the Birch and Swinnerton-Dyer (BSD) Conjecture

1 Introduction

The Riemann Hypothesis (RH)[1] and the Birch and Swinnerton-Dyer (BSD) Conjecture[2] have long been treated as problems of pure analysis and arithmetic. This paper proposes that both find a singular resolution within the geometric properties of 3D manifolds. By examining the convergence of orthogonal cycles—specifically the manifolds $y = x^{2n} + m$ and $y = z^{2n} + m$—we reveal a fundamental mechanism of 180° **mirror inversion**.

At the heart of this theory is the behavior of even-powered systems as they approach the infinite limit ($n \to \infty$). In this state, the manifold transitions from a 3D real-space compression model to a 3D complex-space stretching. We demonstrate that for the system to maintain geometric stability—defined as the state where the 3D real vertical anchor aligns perfectly with the 3D complex operator—the constant m must converge to exactly 1/2.

This convergence creates a **Critical Line of Stability**. Within the framework of the Riemann Hypothesis, this 1/2 alignment represents the geometric center where the 3D geometric stabillty occurs, pinning the non-trivial zeros of the Zeta function. Similarly, for the BSD Conjecture, this stability identifies the point where the analytic L-series and the algebraic rank of a curve synchronize at the pole $s = 1$.

By shifting the perspective from abstract number sequences to the rigid requirements of 3D geometric symmetry, we provide a unified framework that satisfies the conditions of both conjectures through the **3D geometric stability**:

$$\lim_{n\to\infty} I = 2m \implies 1 = 2m \implies m = \frac{1}{2} \tag{1}$$

This result suggests that the critical values in number theory are not mere coincidences, but are necessitated by the topological equilibrium of the underlying manifold.

2 Logical Sequence of Lemmas and Theorem

Lemma 1 (The 180° Inversion of Orthogonal Cycles)**.** *Given the manifolds $y = x^{2n} + m$ and $y = z^{2n} + m$ in 3D-axis space, where $n \in \mathbb{N}$ and $m \in (0, 1)$, the convergence of their solutions at $y = 0$ onto a shared imaginary axis iy constitutes two orthogonal 90° rotations. The sum of these rotations results is 3D complex-space in a total 180° inversion relative to the original 3D real-axis orientation.*

Proof. Consider the equilibrium state where $y = 0$ for both equations:

$$x^{2n} = -m \quad \text{and} \quad z^{2n} = -m \tag{2}$$

1. The 90° Rotation: To satisfy $x^{2n} = -m$ when $n = 1$, x must take the value $\pm i\sqrt{m}$. Geometrically, the transition from the real x-axis to the imaginary iy-axis is a rotation of exactly 90° ($\frac{\pi}{2}$ radians).

2. The Orthogonal Match: Because the equation for z is identical and z is orthogonal to x in 3D space, the z component undergoes an identical 90° rotation to reach the same iy dimension.

3. The 180° Total Flip: In the 3D manifold, the combined transformation T of the system is the sum of these two orthogonal rotations:

$$\text{Total Rotation} = 90^\circ(x \to iy) + 90^\circ(z \to iy) = 180^\circ \tag{3}$$

4. The Inversion Identity: Since $2n$ is always an even integer, the imaginary unit I facilitates this flip. Specifically, the relationship $I^{2n} = -2m$ represents the 180° 3D complex space. As $\lim_{n\to\infty}$, this turns the original 3D compression of the real functions onto a stretched inverted solution set:

$$x^{2n} + z^{2n} = -2m \tag{4}$$

The negative sign on the right-hand side confirms that the resulting 3D geometry complex space structure is a perfect 180° inversion of the original 3D real-space state. □

Lemma 2 (Algebraic Symmetry and 3D compression Real-space)**.** *The 3D compression Real-space algebraic sum* $S(x,z) = (x^{2n}+m)+(z^{2n}+m)$*, where* $m \in (0,1)$*, is invariant under a* $360°$ *rotation about the pivot point* $(0,2m,0)$*.*

Proof. The height $S(x,y)$ is anchored at $S(x,z) = 2m$ when $x, z = 0$. The even power $2n$ ensures that a full rotation swaps x and z while maintaining the sum, preserving the vertical anchor at the pivot in 3D space. □

Lemma 3 (Mapping of 3D Real cycle Rotations to 3D Complex Cycles)**.** *The* $360°$ *rotation of 3D the real surface—governed by variable exponents—maps to a continuous 3D complex cycle. The* $180°$ *inversion synchronizes with this rotation to transform 3D compression real-space roots into an 3D stretched complex manifold.*

Proof. 1. **Dynamic Geometry:** The surface from Lemma 2 is intrinsically dynamic, performing a $360°$ rotation for every single exponent. This establishes a continuous rotational baseline.

2. **Phase Synchronization:** The $180°$ inversion ($x^{2n}+z^{2n} = -2m$) acts as a phase-shift. As the 3D real geometry rotates, the inversion forces the solutions onto the 3D complex space I.

3. **The Zeros Manifold:** Because the rotation is continuous across all exponents, the point $S(x,z) = 0$ (the zero) is never an isolated event. Instead, the 3D complex space "traps" these rotations, making the zero state the constant coordinate of the entire manifold.

4. **Result:** The result is a self-sustaining system where 3D real rotations and 3D complex space are identical, forming a surface where zeros are everywhere.

4. The Complex Mapping: By defining the complex space I such that $I^{2n} = -2m$, we bridge the two domains. The 3D complex space is not a mere rotation of the 3D real cycle, but its inverted mirror image, where the "height" of the 3D real-space cup is reflected across the $S(x,z) = 2m$ plane into the imaginary depths. □

Lemma 4 (The Critical Line Orthogonality)**.** *As* $n \to \infty$*, the 3D complex manifold is defined by two perpendicular critical lines,* i_x *and* i_z*, which intersect at the pivot* m *and . These lines represent the infinite limit of the roots and act as the axes of the* $180°$ *mirror inversion.*

Proof. **1. Identity of the Critical Lines:** For the manifolds $x = (-m)^{1/2n}$ and $z = (-m)^{1/2n}$, the infinite limit $n \to \infty$ stabilizes the complex roots into fixed spatial-imaginary identities, where $x = 1$ and $z = 1$ are must be multiplied by i to demonstrate stabilize complex roots:

$$ix = i_x \quad \text{and} \quad iz = i_z \tag{5}$$

These identities map the complex rotation i directly onto the spatial axes of the 3D-complex manifold.

2. Perpendicularity and Intersection: Since x and z are orthogonal dimensions in 3D space, their mappings i_x and i_z maintain a 90° perpendicularity. Because both manifolds are anchored by the constant at m, these lines intersect at the pivot:

$$\text{Intersection} = i_x \cap i_z = m \tag{6}$$

This forms a stationary geometric cross.

3. Summation of the Inversion: The total transformation of the system is the algebraic sum of the orientations defined by these lines:

$$\text{Total Shift} = i_x(90^\circ) + i_z(90^\circ) = 180^\circ \tag{7}$$

This 180° shift constitutes the mirror mapping.

4. Conclusion: The lines i_x and i_z are the critical boundaries where 3D real growth ceases and the inverted 3D complex space begins. The intersection at m and ensures the symmetry of the 180° flip. □

Lemma 5 (The convergence scale of 3D compression Real-space cycles)**.** *The 3D real manifold sum*

$$S(x, z) = (x^{2n} + m) + (z^{2n} + m)$$

converges to the real scalar $2m$ as $n \to \infty$. This value constitutes the geometric stability of the system.

Proof. The height y is anchored at $y = m$ for each independent manifold. In the 3D sum

$$S = (x^{2n} + m) + (z^{2n} + m),$$

the complex terms vanish at the origin, leaving $S = 2m$. Because $m \in (0, 1)$, the resulting scale $2m$ is a real geometric constant. As $n \to \infty$, the even-power terms x^{2n} and z^{2n} undergo a magnitude collapse to zero within the unit boundary, reinforcing $2m$ as the absolute limit of the manifold's 3D real space anchor. □

Lemma 6 (The convergence scale of 3D stretch complex space). *In the 3D manifold, the total inversion operator I is a function of 3D complex space that maps 3D real cycle, are governed by the compression scale $2n$ such that:*

$$I = (-2m)^{\frac{1}{2n}} \tag{8}$$

As the compression cycle approaches infinity ($2n \to \infty$), the 3D stretched complex cycle converges to unity:

$$\lim_{n\to\infty} I = 1 \tag{9}$$

This proves that the complex space, initially acting as a scaled inversion of the anchor $-2m$, reaches a state of absolute geometric stability (1) through infinite compression real cycle.

Proof. The operator I represents the 3D complex cycle that maps onto 3D real cycle . By applying the $2n$ scale of 3D infinity compression, the magnitude of the inversion is distributed across an infinite series of cycles. Mathematically, as $n \to \infty$, the exponent $\frac{1}{2n}$ approaches 0. The limit of the base $(-2m)$ raised to the power of 0 is 1. Thus, the "inversion" effectively vanishes at the limit, leaving the manifold in a state of perfect unity. □

Lemma 7 (3D geometric stability.). *Given convergence 3D compression Real-space cycles $S = 2m$ and the convergence 3D stretched complex-space cycles limit $\lim_{n\to\infty} I = 1$, the system achieves absolute unity when the real constant $m = \frac{1}{2}$. In this state, the geometric anchor is identically equal to:*

$$2m = 1 \tag{10}$$

unless the 3D manifold system doesn't stable.

Proof. **1. Stability Analysis:** If $m \neq 1/2$, a scalar discrepancy $\delta = |2m-1|$ exists.

- If $m > 1/2$, the convergence of compression 3D Real-space cycle S overpowers the convergence of stretching 3D complex-space cycle I, preventing the manifold from reaching the null state.
- If $m < 1/2$, the convergence of stretching 3D complex-space cycle I is overpowers the convergence of compression 3D Real-space cycles S, preventing the manifold from reaching the null state.

Thus, $m = 1/2$ is the unique condition for absolute 3D geometric stability, forcing the 3D system into a stable geometric identity. $\square$

Lemma 8 (The Spiral Geometry of Rotational Zeros)**.** *Th structural density of zeros within the complex manifold is governed by a fractional spiral progression. A single component, defined by* $y = x^{2n}+1/2$*, undergoes a pure* $180°$ *physical rotation at the pivot* m*, representing a geometric half-spiral. When both orthogonal components combine to complete a* $360°$ *full-spiral rotation at the total pivot depth of* 1*, the system triggers a structural* $180°$ *inversion, trapping the zeros at the absolute equilibrium plane(3D complex-space).*

Proof.

The Physical Half-Spiral (m): At the individual pivot level $m = 1/2$, a single component $y = x^{2n} + 1/2$ undergoes a physical $180°$ geometric rotation for every single n, when $n \in \mathbb{N}$. This rotation traces a half-spiral of non-trivial zeros path in space but maintains its local algebraic sign.

The Full-Spiral Synthesis ($2m$): Combining the independent components (x and z) yields a total spatial rotation. Because each orthogonal component contributes $180°$, their linear summation completes a full-spiral of non-trivial zeros movement:

$$\theta_{\text{total}} = 180° + 180° = 360° \tag{11}$$

This combined rotation spans the total pivot depth of 1.

$\square$

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Lemma 9 (The Isomorphism to RH and BSD)**.** *The condition* $2m = 1$ *at the infinite limit* $n \to \infty$ *provides the analytic foundation for the Riemann Hypothesis and the BSD Conjecture by defining the point of absolute phase cancellation.*

Proof.

1. **Riemann Hypothesis (RH):** The critical strip in the complex plane is defined on the interval $0 < \mathrm{Re}(s) < 1$. Because the 3D manifold achieves stability only when convergent the 3D real cycles scale $2m$ matches the convergence of 3D complex cycles 1, the system is forced into a state of destructive interference at the midpoint. This midpoint, $m = 1/2$, corresponds to the critical line where all non-trivial zeros must reside to satisfy the manifold's equilibrium.

2. **BSD Conjecture:** The convergence of stretched 3D complex manifold sum to 1 at the infinite limit mirrors the analytic behavior of the L-series at the pole $s = 1$. The 180° inversion 3D complex space ensures that the algebraic rank (the "depth" of the complex cycle) and the analytic value (the "height" of the real manifold) are symmetric reflections, satisfying the BSD requirement for alignment at the unit pole.

□

Final Conclusion

Theorem 1 (Universal Symmetry of Geometric Equilibrium)**.** *For any 3D manifold defined by the sum of orthogonal even-power cycles, the system achieves global stability if and only if the real-space anchor* $2m$ *is in perfect equilibrium with the complex-space inversion operator* I*. In the infinite limit* $n \to \infty$*, this equilibrium is satisfied exclusively at* $m = 1/2$*.*

Proof. By the Lemma of 3D geometric stability, any deviation from $m = 1/2$ creates unstable 3D manifold that prevents the collapse of the manifold into a stable geometric line. By 3D geometric stability., the identity $2m = 1$ is the unique solution where the Compression of 3D real-space and the stretched of 3D-complex space perfectly balance one another. This geometric necessity manifests in number theory as:

1. The pinning of non-trivial zeros to the 1/2 critical line in the Riemann Zeta Function.

2. The synchronization of algebraic and analytic properties at the $s = 1$ pole for Elliptic Curves (BSD).

Therefore, the Riemann Hypothesis and the BSD Conjecture are not isolated phenomena, but are the arithmetic reflections of this underlying 3D geometric stability. □

Corollary 1 (The Prime-Rational Density Bridge)**.** *The radius* r *serves as a dynamic scaling factor between the distribution of zeta zeros (RH) and the arithmetic rank of the variety (BSD) in 3D-complex space. Given the perpendicular condition* $ix = -iz$ *and the zeta frequency* $x = it$*, the radius*

r from the symmetry pole(full-spiral of non-trivial zeros) or half spiral non-trivial zeros s is defined by:

$$r^2 = (ix - s)^2 + (iz - s)^2 \tag{12}$$

Substituting the manifold conditions:

$$r^2 = (-t - s)^2 + (t - s)^2 = 2t^2 + 2s^2 \tag{13}$$

Proof. Substituting $ix = -t$ and $iz = t$ (reflecting the perpendicular symmetry) into the radius equation:

$$r^2 = (-t - s)^2 + (t - s)^2$$

Expanding both binomials:

$$r^2 = (t^2 + 2ts + s^2) + (t^2 - 2ts + s^2)$$

The cross-terms ($2ts$) cancel perfectly, yielding:

$$r^2 = 2t^2 + 2s^2$$

This result confirms that the density is a purely real scalar. For $s = 1/2$, r defines the density of prime-zeros; for $s = 1$, it defines the density of rational-point ranks, because zeros are everywhere along those points and the distribution of zeros are linked with prime number(1/2) and rational points($s = 1$), then finding distance from these points to any zeros would be the density of prime-zeros and the density of rational-point ranks , proving that both are governed by the same orthogonal 3D geometry. □

t_n (Zero)	$r = \sqrt{2t^2 + \frac{1}{2}}$	Nearest $P/\mathbb{Q}$	$r = \sqrt{2t^2 + 2}$	Nearest $P/\mathbb{Q}$
14.1347	20.0020	$19(P), 20(\mathbb{Q})$	20.0394	$19(P), 20(\mathbb{Q})$
21.0220	29.7381	$31(P), 30(\mathbb{Q})$	29.7632	$31(P), 30(\mathbb{Q})$
25.0109	35.3778	$37(P), 35(\mathbb{Q})$	35.3990	$37(P), 35(\mathbb{Q})$
30.4249	43.0331	$43(P), 43(\mathbb{Q})$	43.0505	$43(P), 43(\mathbb{Q})$
32.9351	46.5826	$47(P), 47(\mathbb{Q})$	46.5987	$47(P), 47(\mathbb{Q})$

The Scaling Limit

The relationship between the arithmetic rank r and the zeta frequency t exhibits a constant asymptotic ratio:

$$\lim_{t\to\infty} \frac{r}{t} = \sqrt{2} \tag{14}$$

This limit suggests that the "Prime-Rational Bridge" stabilizes at the square root of the dimension of the transformation, providing a geometric upper bound for the rank of a variety relative to its L-function zeros. If we can find central zeros($s = 1$) or zeta zeros($s = 1/2$) at any radial distance, we can find the Prime-Rational Density Bridge at any radial distance. The following theorems leads to find central zeros($s = 1$) or zeta zeros($s = 1/2$) at any radial distance.

Final Proof: Linear Asymptotic Stability of the Spectral Bridge

Theorem:1 Let $ix(r) = \sqrt{r^2 - 1/4} + 1/2$ be the spectral displacement of the variety as a function of the distance r along the critical line. As $r \to \infty$, the displacement ix converges to a unitary mapping with a stable phase offset of $1/2$.

Proof. Consider the displacement function $ix(r)$. To determine the behavior at infinity, we evaluate the limit of the difference between the displacement and the radial distance:

$$L = \lim_{r\to\infty} \left(\sqrt{r^2 - \frac{1}{4}} + \frac{1}{2} - r \right) \tag{15}$$

By rearranging the terms:

$$L = \frac{1}{2} + \lim_{r\to\infty} \left(\sqrt{r^2 - \frac{1}{4}} - r \right) \tag{16}$$

Multiplying by the conjugate $\frac{\sqrt{r^2-1/4}+r}{\sqrt{r^2-1/4}+r}$:

$$L = \frac{1}{2} + \lim_{r\to\infty} \left(\frac{(r^2 - \frac{1}{4}) - r^2}{\sqrt{r^2 - \frac{1}{4}} + r} \right) \tag{17}$$

Simplifying the numerator:

$$L = \frac{1}{2} + \lim_{r\to\infty} \left(\frac{-1/4}{\sqrt{r^2 - 1/4} + r} \right) \tag{18}$$

As $r \to \infty$, the denominator grows without bound, causing the fraction to vanish:

$$L = \frac{1}{2} + 0 = \frac{1}{2} \tag{19}$$

Therefore, for sufficiently large r, the displacement satisfies the linear identity:

$$ix(r) \approx r + \frac{1}{2} \tag{20}$$

$\square$

This proof establishes that for high-order zeta harmonics, the variety's internal geometry is a perfect reflection of the prime distribution frequency, shifted only by the critical line constant of 1/2. By this using equation we can find zeta zeros at any radial distance.

Theorem:2 Let $ix(r) = \sqrt{r^2 - 1} + 1$ be the spectral displacement of the variety as a function of the distance r along the critical line. As $r \to \infty$, the displacement ix converges to a unitary mapping with a stable phase offset of 1.

Proof. Consider the displacement function $ix(r)$. To determine the behavior at infinity, we evaluate the limit of the difference between the displacement and the radial distance:

$$L = \lim_{r\to\infty} \left(\sqrt{r^2 - 1} + 1 - r \right) \tag{21}$$

By rearranging the terms:

$$L = 1 + \lim_{r\to\infty} \left(\sqrt{r^2 - 1} - r \right) \tag{22}$$

Multiplying by the conjugate $\frac{\sqrt{r^2-1}+r}{\sqrt{r^2-1}+r}$:

$$L = 1 + \lim_{r\to\infty} \left(\frac{(r^2 - 1) - r^2}{\sqrt{r^2 - 1} + r} \right) \tag{23}$$

Simplifying the numerator:

$$L = 1 + \lim_{r\to\infty} \left(\frac{-1}{\sqrt{r^2-1}+r} \right) \tag{24}$$

As $r \to \infty$, the denominator grows without bound, causing the fraction to vanish:

$$L = 1 + 0 = 1 \tag{25}$$

Therefore, for sufficiently large r, the displacement satisfies the linear identity:

$$ix(r) \approx r + 1 \tag{26}$$

□

This proof establishes that for high-order elliptical curve harmonics, the variety's external geometry is a perfect reflection of the rational points distribution frequency, shifted only by the critical line constant of 1. By using this equation we can find central zeros at any radial distance.

Structural Mapping of Non-Trivial Zeros (BSD and Zeta)

This part presents the mathematical relationship between radial distances (r) and the heights of non-trivial zeros (t_n), demonstrating their convergence toward prime and rational nodes.

Part 1: Forward Mapping (Radial Distance to Zero Height)

This table tracks the transition from a precise rational radial point (r) to the predicted heights for the Birch and Swinnerton-Dyer (BSD) and Riemann Zeta models.

Part 2: Inverse Mapping (Zero Height to Arithmetic Resonance)

Using the t_n values from the Zeta model above, we map back to the radial space to identify nearest Primes (P) and Rational integers ($\mathbb{Q}$).

Index	Radial distances (r)	Eq 1 (BSD): $\sqrt{r^2-1}+1$	Eq 2 (Zeta): $\sqrt{r^2-\frac{1}{4}}+\frac{1}{2}$
r_1	13.6255	14.5888	14.1163
r_2	20.5159	21.4915	21.0098
r_3	25.5058	26.4862	26.0009
r_4	29.9207	30.9040	30.4165
r_5	32.4312	33.4158	32.9273

Table 1: Calculated Zero Heights for BSD and Zeta Models

t_n (Zero)	$r=\sqrt{2t^2+\frac{1}{2}}$	Nearest $P/\mathbb{Q}$	$r=\sqrt{2t^2+2}$	Nearest $P/\mathbb{Q}$
14.1163	19.9760	$19(P), 20(\mathbb{Q})$	20.0135	$19(P), 20(\mathbb{Q})$
21.0098	29.7208	$29(P), 30(\mathbb{Q})$	29.7460	$29(P), 30(\mathbb{Q})$
26.0009	36.7776	$37(P), 37(\mathbb{Q})$	36.7980	$37(P), 37(\mathbb{Q})$
30.4165	43.0213	$43(P), 43(\mathbb{Q})$	43.0387	$43(P), 43(\mathbb{Q})$
32.9273	46.5717	$47(P), 47(\mathbb{Q})$	46.5878	$47(P), 47(\mathbb{Q})$

Table 2: Arithmetic Resonance at Radial Distances

Part 3: Inverse Mapping for BSD-Type Zeros

Using the t_n values from the BSD model (Eq 1), we map back to identify the specific radial resonances associated with elliptic curve L-function zeros.

These are also another way to calculate the Prime-Rational Density Bridge.

This research identifies a fundamental distinction between **Traditional Zeta Zeros** (e.g., $t \approx 14.1347$) and **Geometric BSD/Zeta Zeros** (e.g., $t \approx 14.1163$). We conclude that both sets are governed by precise radial distances r.

The slight variance between these heights suggests a "refractive" shift in arithmetic space, where **BSD zeros** and **non-traditional zeros** align with exact **prime or rational nodes** ($P/\mathbb{Q}$). At high radial resonances like $r = 47$, these values converge, predicting elliptic ranks and zero distributions far beyond current theoretical limits.

t_n (BSD)	$r = \sqrt{2t^2 + \frac{1}{2}}$	Nearest $P/\mathbb{Q}$	$r = \sqrt{2t^2 + 2}$	Nearest $P/\mathbb{Q}$
14.5888	20.6416	$19(P), 21(\mathbb{Q})$	20.6779	$19(P), 21(\mathbb{Q})$
21.4915	30.4005	$31(P), 30(\mathbb{Q})$	30.4252	$31(P), 30(\mathbb{Q})$
26.4862	37.4611	$37(P), 37(\mathbb{Q})$	37.4811	$37(P), 37(\mathbb{Q})$
30.9040	43.7090	$43(P), 44(\mathbb{Q})$	43.7262	$43(P), 44(\mathbb{Q})$
33.4158	47.2613	$47(P), 47(\mathbb{Q})$	47.2771	$47(P), 47(\mathbb{Q})$

Table 3: Arithmetic Resonance for BSD-Type Zero Heights

Summary

By moving the problem from the domain of infinite series to the domain of 4D manifold topology, we have shown that the value 1/2 is a geometric requirement for symmetry. The 180° inversion mechanism provides the "mirror" that forces these complex systems into a state of perfect, predictable balance at the unit midpoint.

Acknowledgments

During the preparation of this work, the author used AI tools for LaTeX formatting and linguistic refinement to ensure clarity of the geometric arguments. The author reviewed and edited all outputs and takes full responsibility for the final content and mathematical claims of this publication.

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