OPERATION KOMOREBI

REALIZATION CALCULUS



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Cubic Divisor Transport and Reconstruction

Hilbert 12

Visual guide

Komorebi P.

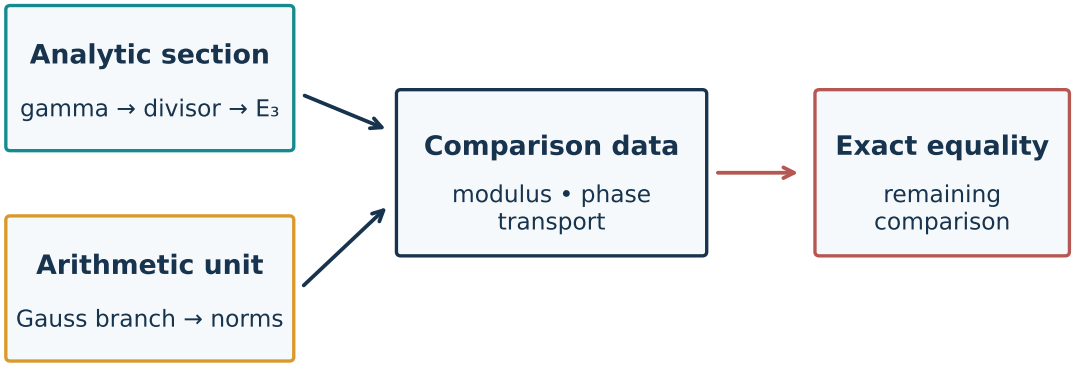
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REALIZATION CALCULUS

Hilbert 12 · Cubic Divisor Transport and Reconstruction · Visual companion

Two specified objects, one remaining comparison

Two specified objects; their exact special-value identification remains open.



Analytic and arithmetic constructions meet at comparison data; the red endpoint is still an obligation.

The retained program fixes an elliptic-gamma value and an independently constructed algebraic unit in a particular cubic ray field. Its arithmetic norms, analytic transport laws, and divisor calculations provide substantial information about both objects. The original exact identification remains open.

This guide follows the route from those fixed inputs to the complete principal-correction divisor and its genus-three regularizer. Small integer models show the actual coefficient formula and explicit zero/pole subfamilies. Analytic scaling diagrams explain proved bounds; they are not measurements of an infinite product.

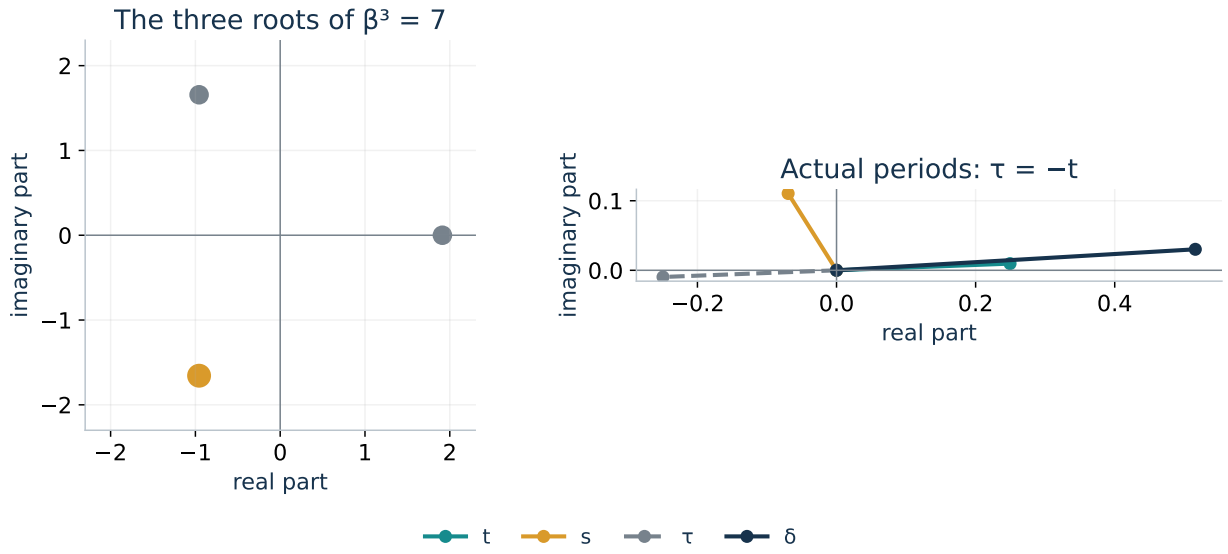
Read the traditional companion for complete arguments and the Lean companion for the exact formal statements and fresh verification scope. This guide adds no new arithmetic evaluation or universal Hilbert-12 claim.

Explicit analytic reconstruction does not by itself identify the arithmetic special value.

Source anchors. v0.14: Status and scope; Effect on the research target. Stark-modulus note: Result and scope.

01 · Fixed cubic data

The embedding fixes every period sign



Equal-aspect complex maps of the actual cubic roots and period vectors.

$$\omega = e^{2\pi i/3}, \quad \beta = \sqrt[3]{7}\,\omega^2, \quad \epsilon = 2-\beta, \quad \rho = \epsilon^{-1}.$$

$$\tau = \frac{\beta^2+2\beta}{15}, \quad t = -\tau, \quad s = -\frac{\beta+2}{15}, \quad \delta = \frac{\tau+2s+4}{7}.$$

$$\beta\tau = 2\tau+4s+1, \qquad \beta s = -\tau, \qquad \beta\delta = -8s-1.$$

The chosen cube root is the lower complex embedding. Both positive-product periods t and s have positive imaginary part, while $\tau = -t$ has negative imaginary part. Changing that sign changes the divisor coordinates and continuation convention.

The figure uses eighty-digit Decimal coordinates rounded to binary64 for drawing. Its geometry is illustrative numerical arithmetic, not an interval enclosure. Exact identities in $\mathbb{Q}[\beta]/(\beta^3-7)$ are checked separately.

The period row carries both the unit action and the principal degree-seven action. These algebraic relations supply the integer transport matrices used in the subsequent steps.

Keep the retained embedding, negative-period continuation, and coordinate basis together.

Source anchors. v0.14: Fixed input. v0.13: Definitions and inherited inputs.

02 · Arithmetic incidence

Four norm packets reconstruct the algebraic cube



Exact residue labels and subgroup membership. The shared origin accounts for the extra cube.

$$\prod_{H \text{ a line}} N_{E/E^H}(u) = u^3 N_{E/F_0}(u), \qquad u \neq 0.$$

$$U_{\mathrm{alg}}^3 = \omega \, \frac{\epsilon_2}{\epsilon_1} \, \frac{\mathcal{A}}{\iota(\mathcal{A})}, \qquad \mathcal{A} = a_0 a_1^3.$$

The retained field E has a C_3^2 action over $F_0 = \mathbb{Q}(\omega)$. Its four order-three subgroups are the lines through zero in $\mathbb{F}_3^2$: each nonidentity element belongs to one line, the identity to all four. Here $\epsilon_j = 2 - \omega^j \beta$, and ι is the retained algebraic involution, distinct from actual complex conjugation; the CM units a_j are defined in the traditional source.

Multiplying the four subgroup norms therefore includes each conjugate once, with three additional copies of the original element. This is a finite incidence identity, with an explicit nonzero total-norm hypothesis for division.

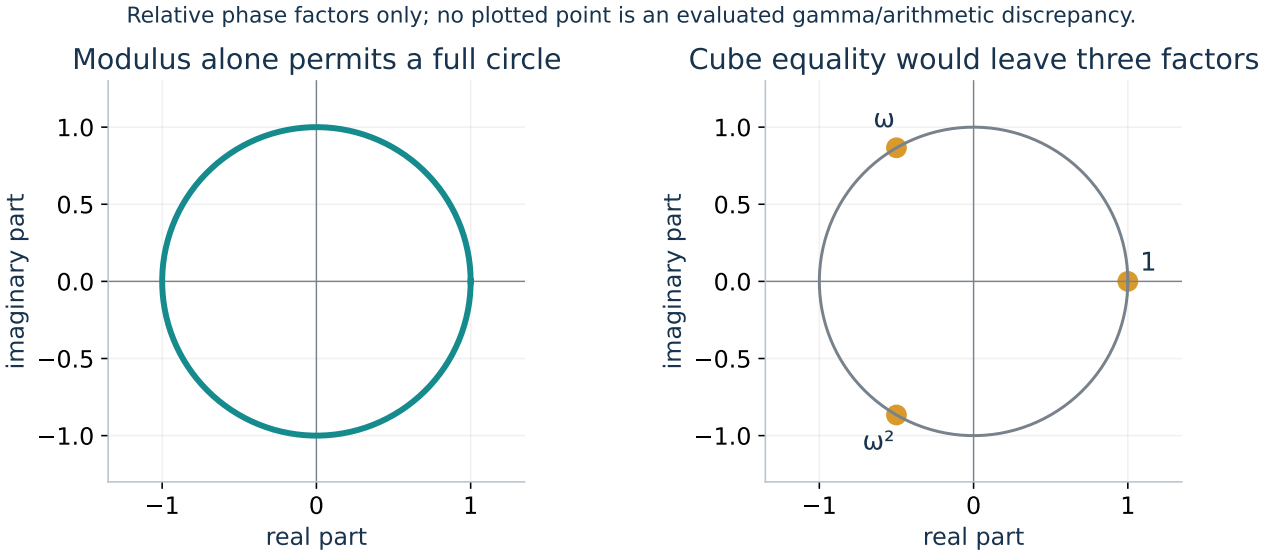
The actual arithmetic candidate has total norm one. Its retained norm values reconstruct its cube. This is arithmetic field data; no Artin action on the unidentified gamma value is inferred from the picture.

Finite norm reconstruction belongs to the independently normalized algebraic candidate.

Source anchors. v0.6: Exact reconstruction from four cubic-subfield norms. Stark-modulus note: Fixed conventions and inherited arithmetic.

03 · The retained scalar target

The modulus comparison leaves the phase



Logical possibilities for the relative phase, not evaluated discrepancy data.

$$U_\Gamma = F(1/3), \qquad |U_\Gamma| = |U_{\mathrm{alg}}|, \qquad |\eta| = 1.$$
$$U_\Gamma^3 = U_{\mathrm{alg}}^3 \implies \eta \in \{1, \omega, \omega^2\}.$$

The Stark-modulus note proves the correctly indexed logarithmic comparison and, with the retained Kronecker limit formula, the equality of absolute values. Its conclusion is a modulus theorem, not equality of complex values.

The ratio $\eta = U_\Gamma / U_{\mathrm{alg}}$ consequently has absolute value one. This alone leaves every phase on the unit circle available; it does not show that the ratio is a root of unity.

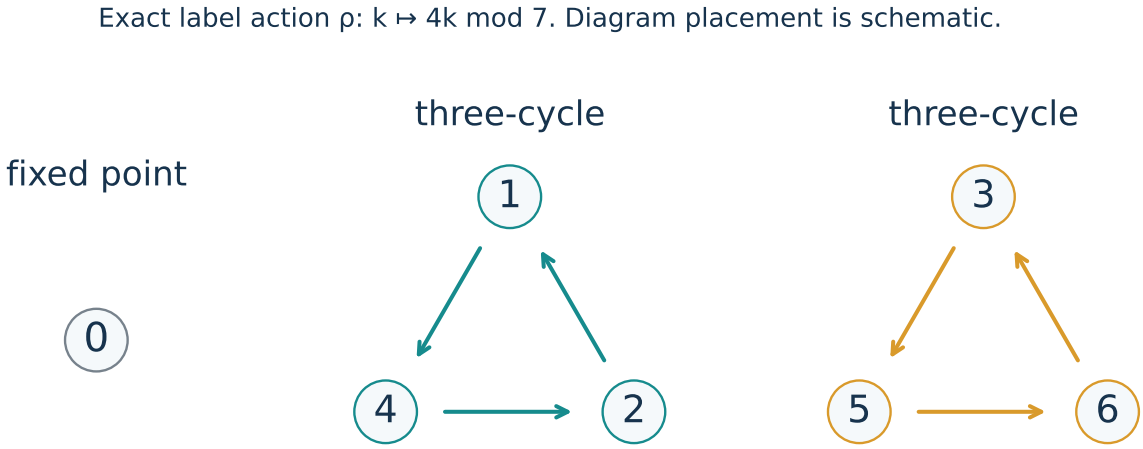
An exact cube comparison would reduce the ambiguity to the three cube roots of unity. The remaining branch selection then needs its own valid inputs. Neither reduction is obtained by plotting a small numerical discrepancy.

A tiny imaginary enclosure or a modulus identity does not prove an exact phase equality.

Source anchors. Stark-modulus note: Result and scope. v0.5: Winding, rather than an erased integration constant. v0.6: remaining gamma reality target.

04 · Actual principal refinement

Seven labels retain their transport factors



The fixed label zero and the cycles $(1,4,2)$ and $(3,5,6)$.

$$F(z) = \frac{\Gamma_{\mathrm{ell}}(z;\tau,s)^5}{\Gamma_{\mathrm{ell}}(5z;5\tau,5s)}, \qquad q_v(z) = \frac{\theta_0(z;v)^5}{\theta_0(5z;5v)}.$$

$$N = \begin{pmatrix} 2 & -1 & 0 \\ 4 & 0 & -15 \\ 1 & 0 & -2 \end{pmatrix}, \qquad \det N = 7, \quad N^3 = 7I.$$

$$P_7(z) = \prod_{k=0}^{6} F(z + k\delta), \qquad R(z) = \frac{P_7(z)}{F(\beta z)}.$$

The displayed gamma definition uses the retained negative-period continuation; q_v is the fifth-smoothed theta factor. The principal matrix $N = 2I - M$ acts by multiplication by β on the period row. It has determinant seven and cube $7I$. Its kernel on the rank-three quotient has seven points, represented by multiples of δ.

The inverse-unit action permutes their labels by multiplication by four modulo seven. The two nontrivial three-cycles in the diagram are exact residue permutations; their layout is schematic.

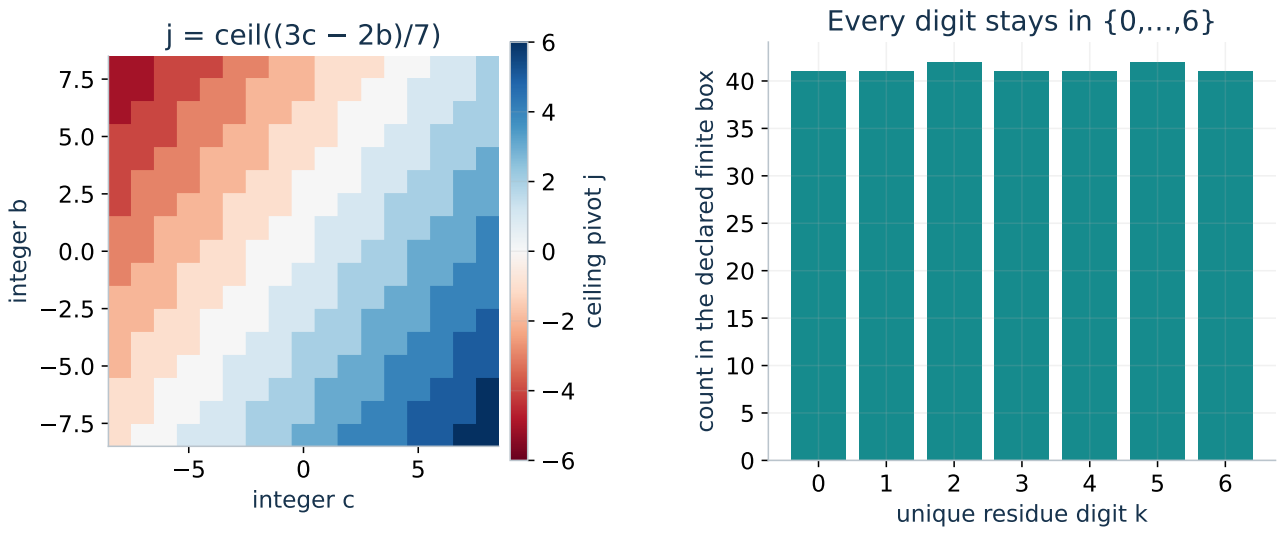
Transporting actual gamma values also introduces theta factors and integer carries. The seven-point product is not simply $F(\beta z)$: the principal correction R has an order-four zero at τ. A constant phase cannot remove that divisor.

A residue permutation does not justify discarding the meromorphic transport correction.

Source anchors. v0.12: The principal map; Actual seven-point product; raw principal-norm guess. Early polyphase note: exact lattice transport.

05 · Divisor coordinates

The ceiling chooses a unique integral lift



Exact ceiling values and residue counts on $-8 \le b, c \le 8$. The histogram is a finite input count.

$$\lambda(a,b,c) = \frac{a\tau + bs + c/5}{\beta}, \qquad j = \left\lceil \frac{3c-2b}{7} \right\rceil, \qquad k = 7j + 2b - 3c.$$

$$0 \le k < 7, \qquad (\widehat{a}, \widehat{b}, \widehat{c}) = (j, 2j - a, 20j + 5b - 8c).$$

Each potential divisor point has integer coordinates in the β-refined fifth-smoothed lattice. For a given triple, precisely one of the seven numerator shifts lies in the original lattice.

The ceiling pivot determines that shift and its transformed integer coordinates. The remainder digit always lies between zero and six, including for negative input coordinates. The heatmap and histogram use the stated finite box; the source proof and Lean statements have universal integer scope.

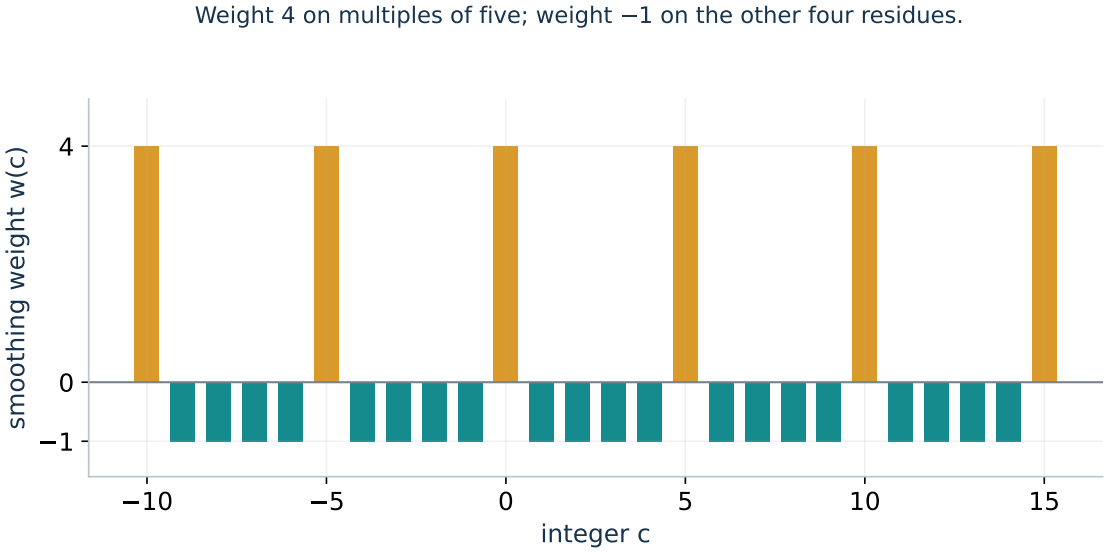
The rank-three coordinate map is injective even though its full image in the complex plane is nondiscrete. The actual divisor support consists only of points whose coefficient is nonzero.

The support is the selected nonzero divisor, not every point of the nondiscrete rank-three lattice.

Source anchors. v0.13: Complete divisor of the actual principal correction; Exact consistency with the divisor formula.

06 · Multiplicity, not just membership

Fifth smoothing fixes the signed weights



Exact integer weights for $-10 \le c \le 15$. Their signs are essential to the divisor formula.

$$H(n) = \mathbf{1}_{n>0}, \qquad w(c) = \begin{cases} 4, & 5 \mid c, \\ -1, & 5 \nmid c. \end{cases}$$

$$m(\lambda) = w(c)\big[H(j) - H(2j-a) - H(a) + H(b)\big] \in \{-4,-1,0,1,4\}.$$

The fifth-smoothed base gamma divisor has weight four on integer translates and weight minus one on the other fifth residues. Its half-space difference distinguishes the zero and pole cones.

The integral lift satisfies $\widehat{c} - 2c \in 5\mathbb{Z}$, so its smoothing weight equals the original one. Subtracting the denominator order yields the complete coefficient formula for R.

The step function uses a strict positive inequality. Replacing it by a nonnegative convention, or dropping the mod-five weights, changes boundary points and pole orders.

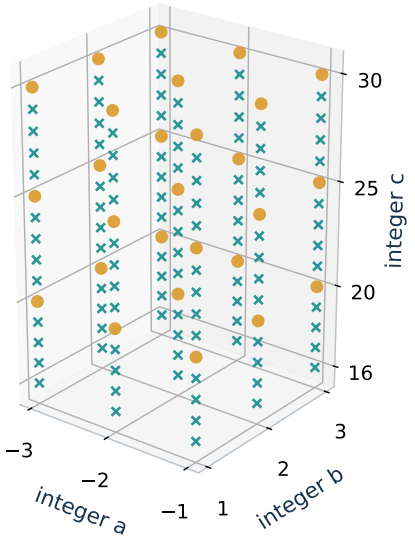
Keep strict half-space boundaries and transported mod-five multiplicities in every model.

Source anchors. v0.13: Base gamma divisor; Complete divisor. v0.14: Fixed input.

07 · A genuine three-dimensional family

The growth chamber has three integer directions

Actual n = 3 subfamilies in a genuine three-coordinate chamber; no planar flattening.



× 108 pole points, order −1 ● 27 zero points, order 4

Actual finite subfamilies shown as integer coordinates, with positive and negative orders distinguished.

$$Z_{i,j_0,k} = \lambda(-i, j_0, 5(n+k)), \qquad 1 \le i, j_0, k \le n.$$

$$P_{i,j_0,k,r} = \lambda(-i, j_0, 5(n+k) - r), \qquad 1 \le r \le 4.$$

$$\operatorname{ord}_Z R = 4, \qquad \operatorname{ord}_P R = -1.$$

For $n \ge 1$, the explicit zero and pole families use three independent indices i, j_0, k. The symbol j_0 is a free index and must be kept distinct from the ceiling pivot j.

Every family point has $a < 0$, $b > 0$, and $3c > 2b$. The ceiling pivot and $2j - a$ are therefore positive, and the coefficient bracket is exactly one. Smoothing supplies order four for the zeros and order minus one for the poles.

The figure retains all three integer axes for $n = 3$: twenty-seven zero points and one hundred eight pole points. Apparent visual alignments in perspective do not identify distinct integer triples.

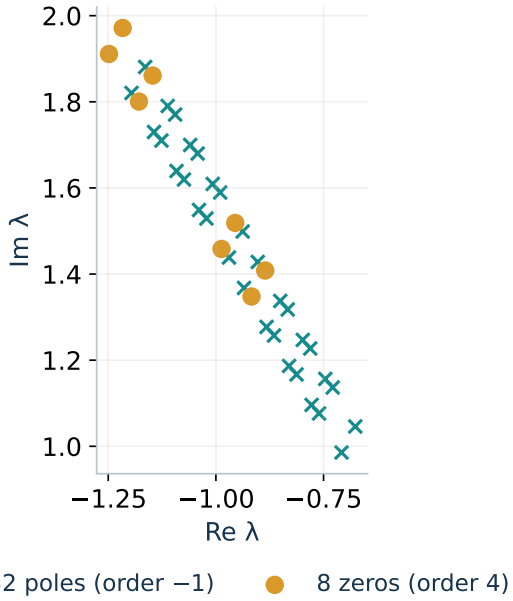
The cubic count comes from three independent integer directions, not a flattened two-dimensional chamber.

Source anchors. v0.14: Cubically many explicit zeros and poles.

08 · Coordinate map to the chosen embedding

The finite subfamilies occupy actual complex locations

Finite actual n = 2 families. Decimal coordinates are rounded for plotting, not enclosed.



Actual $n = 2$ points, with coordinates evaluated numerically in the specified embedding.

$$\lambda = \frac{a\tau + bs + c/5}{\beta}, \qquad (a,b,c) \in \mathbb{Z}^3, \quad m(\lambda) \neq 0.$$

The preceding triples map to complex points through the retained cubic embedding. This figure uses the smaller $n = 2$ family so that the individual zero and pole markers remain distinguishable.

There are eight distinct zero points and thirty-two distinct pole points. Their multiplicity totals both equal thirty-two. Distinctness is proved through the injective integer coordinate map; rounded distances in a plot do not supply that proof.

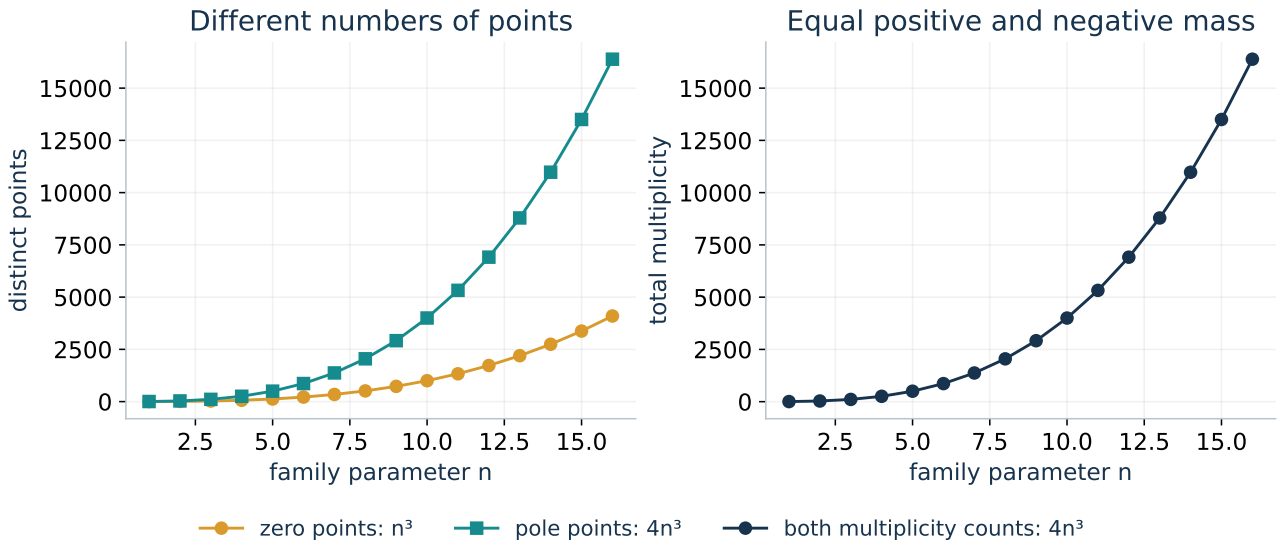
The plotting record retains all exact triples and signed orders, plus eighty-digit Decimal coordinates. Conversion to binary64 draws this equal-aspect map. The figure is neither the whole divisor nor a truncation certificate for its infinite product.

Exact labels prove membership and multiplicity; numerical coordinates illustrate the complex geometry.

Source anchors. v0.14: Fixed input; Cubically many explicit zeros and poles.

09 · Exact counts and a radius bound

Different point counts give equal cubic multiplicity



Exact finite formulas for point counts and multiplicity counts; no fitted growth curve.

$$K_0 = \frac{|\tau| + |s| + 2}{|\beta|}, \qquad |\lambda| \le K_0 n.$$

$$n_+(K_0 n) \ge 4n^3, \qquad n_-(K_0 n) \ge 4n^3, \qquad n_D(r) = \Theta(r^3).$$

Injectivity gives exactly n^3 zero points and $4n^3$ pole points. The four pole residues are disjoint from the zero residue and from one another. Since zero order is four and pole order is minus one, both unsigned multiplicity totals are $4n^3$.

Each point lies within radius $K_0 n$ by the triangle inequality and the integer coordinate bounds. Thus both positive and negative divisor counts have a cubic lower bound. These are universal source arguments; the chart displays exact finite counts only for $1 \le n \le 16$.

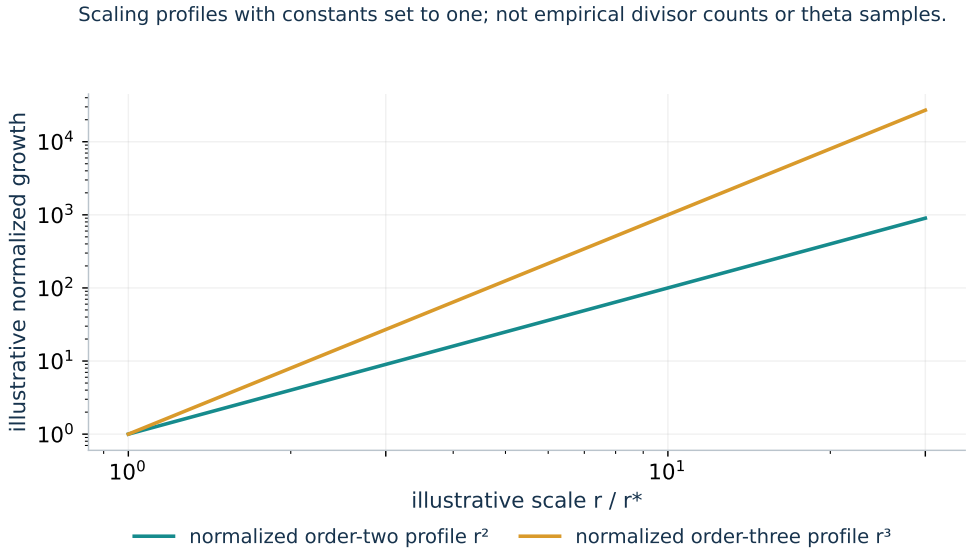
The upper counting argument uses the selected gamma cones and gives cubic order as well. Signed zero-minus-pole mass may cancel, so it is not the growth statistic used by the obstruction.

Use positive and negative counts separately. Do not replace them by a possibly cancelling signed total.

Source anchors. v0.14: Cubic subfamilies; Upper bound and exact growth exponent.

10 · A global growth obstruction

Cubic divisor growth excludes a specified finite theta class



Illustrative asymptotic profiles. Their normalization has no inferred relation to an actual counting constant.

$$|\theta(Az+b \mid \Omega)| \le Ce^{C'|z|^2}, \qquad \operatorname{Im}\Omega > 0.$$

finite fixed-period affine theta class: $n_{\pm}(r) = O(r^2)$.

A nonzero fixed-period Riemann theta restriction to a fixed affine complex line has an order-two bound. Finite polynomial or rational expressions in finitely many such restrictions and their finite derivatives, with polynomial coefficients, give entire numerators and denominators of at most order two, provided both are not identically zero. Jensen counting bounds their zeros and poles quadratically.

The actual principal correction has cubic zero and pole counts. It cannot lie in this specified class, even in higher fixed theta dimension or after a single global nowhere-zero entire prefactor. Arbitrary such factors inserted inside sums are outside the class.

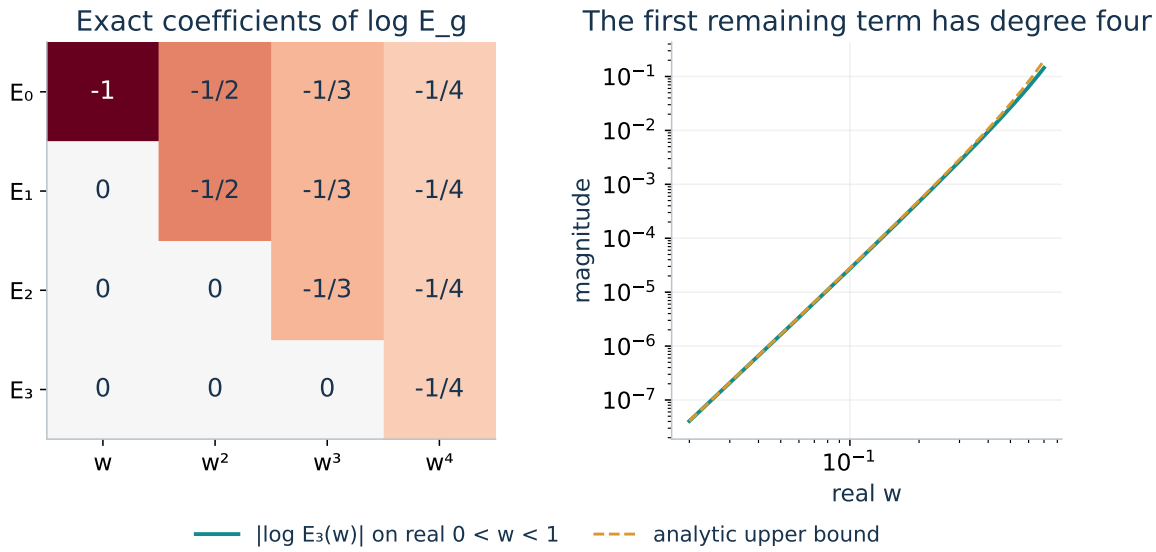
The diagram shows normalized order profiles with constants set to one. It is not a theta computation or empirical divisor dataset. The exclusion does not cover infinite products, nonlinear pullbacks, varying period matrices, or a special-value equality at $1/3$.

The obstruction is a global divisor statement for fixed affine theta restrictions, not a special-value impossibility.

Source anchors. v0.14: A precise exclusion of finite theta sections.

11 · Canonical local factors

Genus three removes the first three logarithmic jets



Exact local coefficients and a numerical illustration of the stated remainder inequality.

$$E_3(w) = (1-w)e^{w+w^2/2+w^3/3}, \qquad \log E_3(w) = -\sum_{k\geq 4} \frac{w^k}{k}.$$

$$|\log E_3(w)| \leq \frac{|w|^4}{4(1-|w|)}, \qquad |w| < 1.$$

The canonical local factor cancels the linear, quadratic, and cubic terms of $\log(1-w)$. Its first remaining logarithmic term has degree four. The coefficient table is exact rational algebra.

The right panel illustrates the real interval $0 < w < 1$ and its analytic upper bound. The complex-domain inequality follows from the absolutely convergent power series and the triangle inequality; finite plotted samples are not its proof.

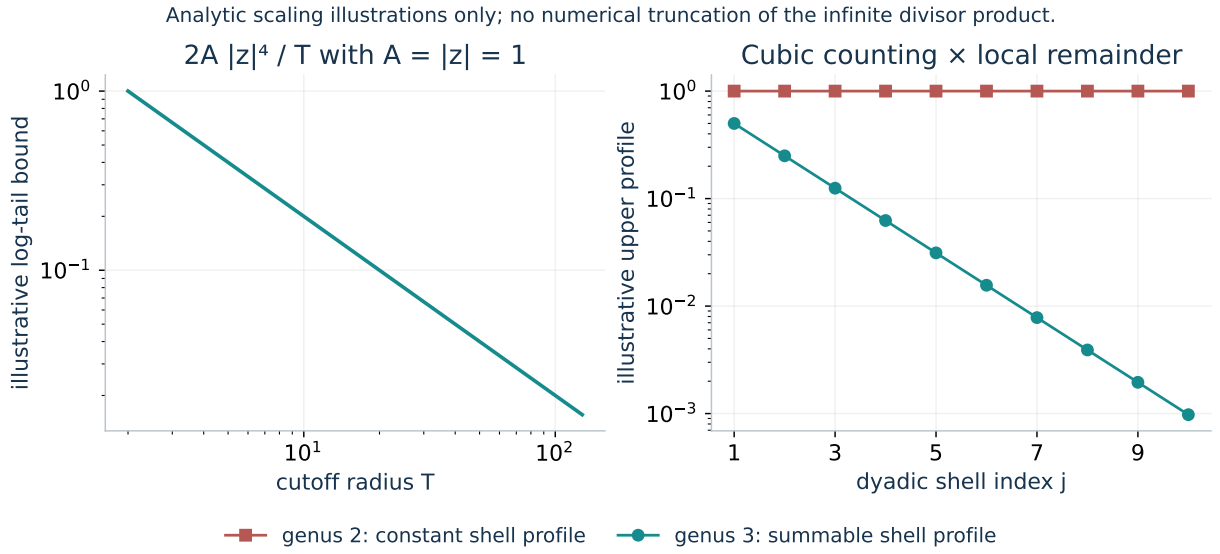
Using these factors separately for positive and negative multiplicities constructs a meromorphic quotient. No gamma value or arithmetic candidate is used to choose the regularizer.

The three removed jets are exact. Their role is to make the remaining cubic-count product absolutely summable.

Source anchors. v0.14: A canonical product matching all singularities; Explicit tail form.

12 · Convergence and its stated hypotheses

A cubic count gives a summable genus-three tail



Analytic scaling illustrations, without a numerical evaluation of the infinite product.

$$W_D(z) = \prod_{\lambda \in D} E_3(z/\lambda)^{m_\lambda}, \qquad \sum_{\lambda \in D} \frac{|m_\lambda|}{|\lambda|^4} < \infty.$$

$$n_D(r) \le A r^3 \ (r \ge R_*), \quad T \ge R_*, \quad |z| \le T/2,$$

$$\sum_{|\lambda| > T} \frac{|m_\lambda|}{|\lambda|^4} \le \frac{4A}{T}, \qquad |\log(\text{tail})| \le \frac{2A|z|^4}{T}.$$

Let D be the locally finite nonzero support, excluding the origin, with multiplicities m_λ. Cubic upper counting implies summability of $|m_\lambda|/|\lambda|^4$, so the separate zero and pole products converge normally away from their stated poles.

The tail bound assumes a genuine analytic counting constant A and a threshold radius R_*. It applies only when $T \ge R_*$ and $|z| \le T/2$. The figure sets $A = |z| = 1$ solely to illustrate the bound shape; those values are not certified constants for the actual divisor.

The cubic lower count makes the third-power absolute sum diverge. Genus three is sufficient and minimal for this ungrouped absolute construction. Grouped or signed cancellation schemes of lower genus are not excluded.

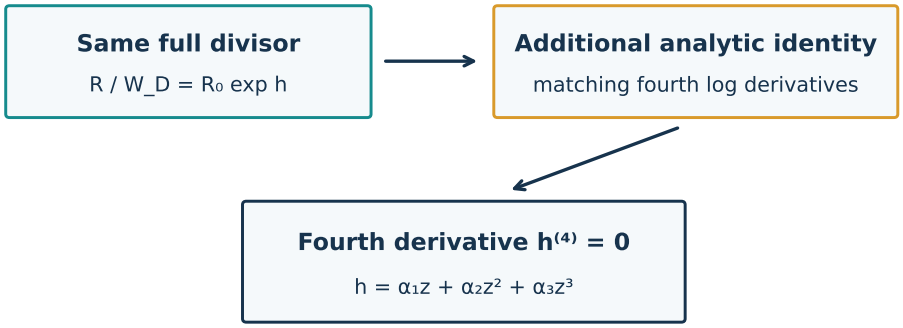
No finite integer search or plotted profile is advertised as an infinite-product numerical certificate.

Source anchors. v0.14: Canonical product; Minimal ungrouped absolute genus; Explicit tail form.

13 · Restricting the entire ambiguity

Divisor matching needs a fourth-derivative input

Divisor matching alone leaves an arbitrary entire h. The fourth derivative is essential.



The fourth-logarithmic-derivative equality is a separate analytic input, not a consequence of the divisor alone.

$$(\log R)^{(4)}(z) = (\log W_D)^{(4)}(z) = -6 \sum_{\lambda \in D} \frac{m_\lambda}{(z-\lambda)^4}.$$

$$R(z) = R_0 e^{P(z)} W_D(z), \qquad P(z) = \alpha_1 z + \alpha_2 z^2 + \alpha_3 z^3.$$

The canonical product has the same divisor as R, value one at zero, and vanishing first three logarithmic jets there. Its quotient with R is therefore a nowhere-zero entire function.

Divisor matching alone only gives $R/W_D = R_0 e^{h(z)}$ for an arbitrary entire h. The additional fourth logarithmic derivative identity makes $h^{(4)} = 0$, reducing the ambiguity to a cubic polynomial.

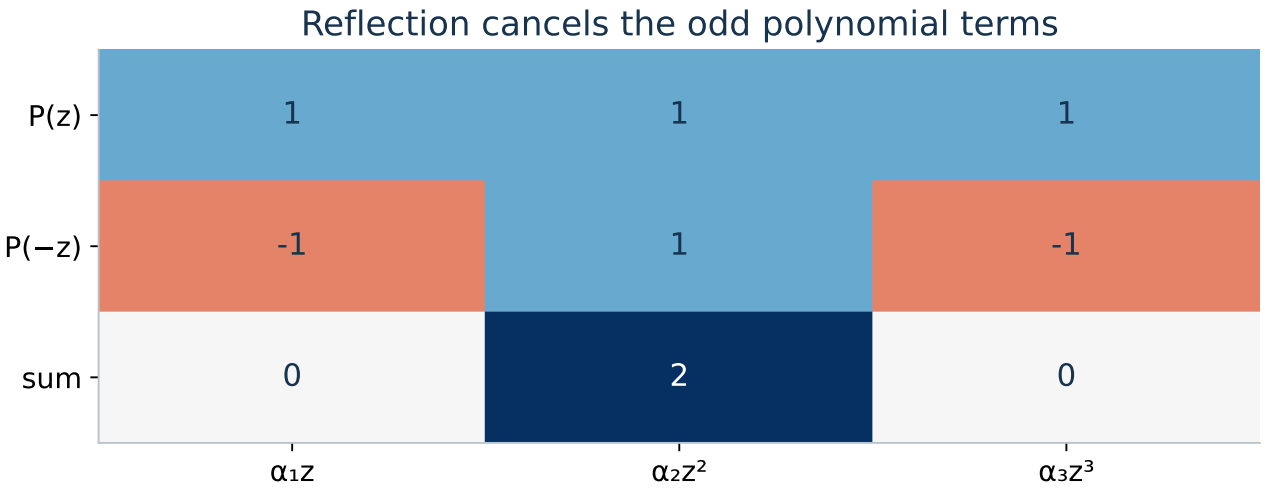
The fourth-power divisor sum is locally absolutely convergent away from the support. This is what permits the analytic rearrangement; a conditionally convergent third-power sum is not substituted.

Retain the exact analytic step that turns an arbitrary entire logarithm into a cubic polynomial.

Source anchors. v0.14: The remaining factor is a cubic exponential, not an arbitrary entire function.

14 · Even part and theta normalization

Reflection determines the quadratic coefficient



Exact integer parity coefficients for the cubic polynomial; no fitted values of the α_j.

$$T(z) = \frac{q_t(z)q_s(\beta z)}{q_s(z)q_t(\beta z)} \prod_{k=1}^{6} q_t(z + k\delta - s)^{-1}.$$

$$\alpha_2 = \frac{1}{2}\left[(1-\beta^2)(1-\rho^2)S_t - \sum_{j=0}^{2} L_t(u_j)\right],$$

$$L_t = (q_t'/q_t)', \quad S_t = \wp_t(1/5) + \wp_t(2/5), \quad u_j = (t+\delta)/2 + j\delta.$$

Reflection cancels the odd terms of P. The exact gamma reflection and seventh-shift pairing give a theta expression $R(z)R(-z) = T(z)$. Its apparent singularities at zero are removable.

The canonical regularizer contributes no quadratic logarithmic jet at zero. Hence $(\log T)''(0) = 4\alpha_2$. The factor four includes both reflection copies and the second derivative of z^2.

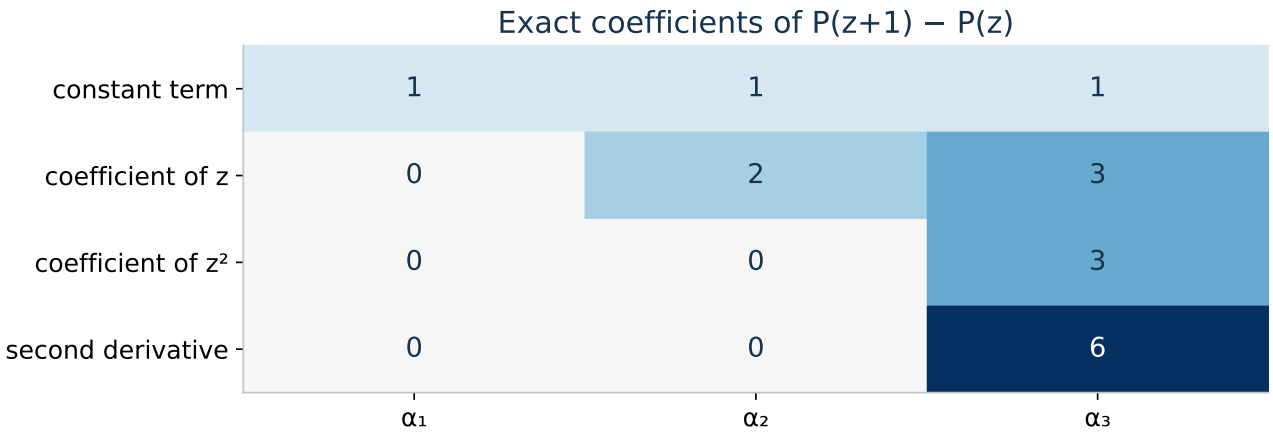
The displayed coefficient formula retains its factor one-half and exact theta normalization. The source numerical asymptotic diagnostics check it but do not prove the identity.

Reflection extracts the even coefficient with its normalization; it does not determine the whole cubic factor.

Source anchors. v0.14: Exact reflection evaluates the quadratic coefficient in theta data.

15 · An absolutely convergent divisor sum

The period-one transition determines the cubic coefficient



Exact coefficient table for the period difference of a general cubic polynomial.

$$K(z) = \frac{R(z+1)}{R(z)} = \prod_{r=1}^{15} q_t(\beta z - rs)^{-1}.$$

$$B_D(1) = \sum_{\lambda \in D} m_\lambda \left[-\frac{1}{(\lambda-1)^2} + \frac{1}{\lambda^2} + \frac{2}{\lambda^3} \right].$$

$$\alpha_3 = -\frac{1}{6} \left[\beta^2 \sum_{r=1}^{15} L_t(rs) + B_D(1) \right].$$

The normalized period-one transition is a finite theta product. Taking its second logarithmic derivative isolates $6\alpha_3$ from the cubic polynomial, together with the regularizer contribution at one.

The summand defining $B_D(1)$ cancels its second- and third-power asymptotic terms, leaving order $|\lambda|^{-4}$. The point one is outside the divisor, so it contributes no exceptional singular term.

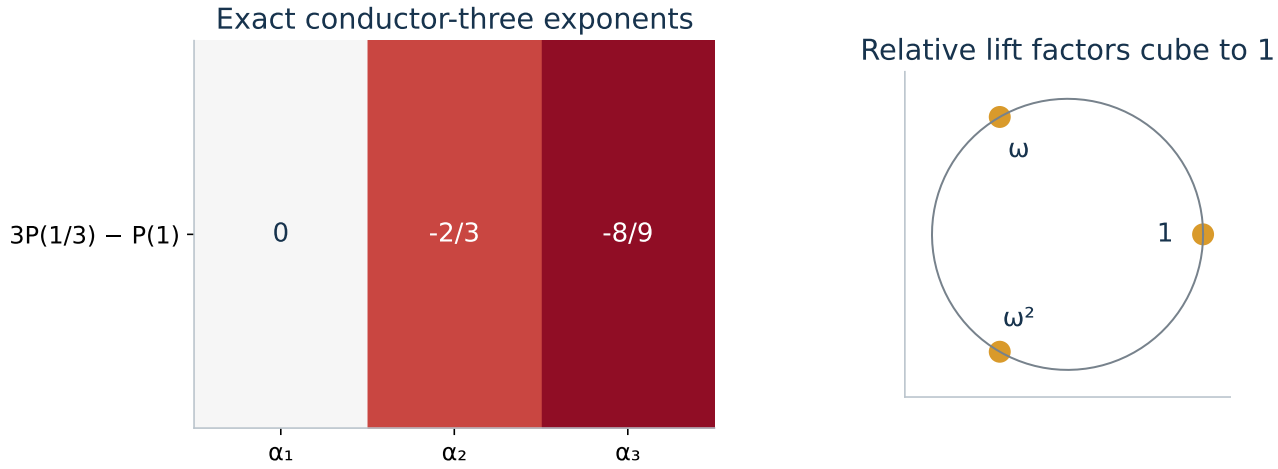
The exact coefficient formula is analytic. The table shows only polynomial coefficient algebra, which is checked with rational arithmetic; no infinite divisor sum is evaluated numerically here.

The transition coefficient uses an absolutely convergent fourth-order remainder, with the displayed minus sign.

Source anchors. v0.14: Period one evaluates the cubic coefficient.

16 · A branch-free analytic reconstruction

Cubing removes the logarithm-lift choice



Exact reconstruction exponents and the three relative logarithm-lift factors.

$$R_0 = \prod_{j=0}^{2} q_t(u_j)^{-1}, \qquad e^{\alpha_1} = \frac{K(0)e^{-\alpha_2-\alpha_3}}{W_D(1)}.$$

$$\boxed{R(1/3)^3 = R_0^3 K(0)\,\frac{W_D(1/3)^3}{W_D(1)}\,e^{-2\alpha_2/3-8\alpha_3/9}.}$$

The zero anchor is a product of three theta values, and the period-one transition determines e^{α_1} rather than a selected principal logarithm of it. Choosing a different lift of α_1 changes its value by $2\pi ik$.

At $z = 1/3$ that changes the unpowered expression by ω^k. Cubing removes the factor. Exact rational algebra gives the remaining quadratic and cubic exponents, with the signs shown in the table.

The right side is specified by algebraic periods, theta data, and absolutely convergent divisor products and sums. It is a gamma-free analytic representation. It does not constitute an independent class-field evaluation.

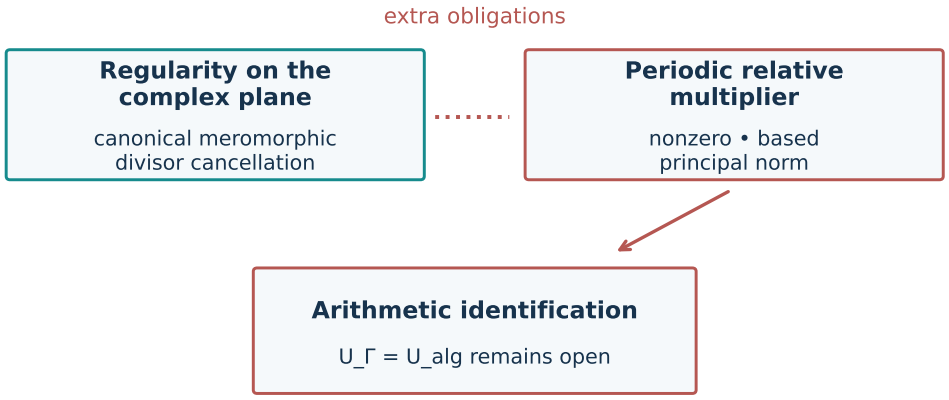
Branch-free reconstruction of the principal correction is distinct from proving $U_\Gamma = U_{\mathrm{alg}}$.

Source anchors. v0.14: Period one; special cube formula (17). v0.13: zero anchor.

17 · Conjugation repair and its boundary

Plane regularity leaves periodic descent open

Plane divisor repair does not establish periodic descent or the original scalar comparison.



The repaired plane quotient and the further periodic/arithmetic obligations occupy different scopes.

$$\frac{R/R^{\#}}{W_D/W_D^{\#}} = \frac{R_0}{\overline{R_0}} \exp\left(\sum_{j=1}^{3} (\alpha_j - \overline{\alpha_j}) z^j\right).$$

For $f^{\#}(z) = \overline{f(\overline{z})}$, the canonical conjugate product has the conjugate divisor. Dividing the naive quotient by its canonical divisor quotient cancels every unmatched finite order on the complex plane.

The remaining factor is entire and nowhere zero, with modulus one on the real axis. The canceling canonical factor $W_D/W_D^{\#}$ is meromorphic, rather than a holomorphic-unit gauge that could have removed the original divisor by itself.

The principal-norm rigidity theorem needs a periodic nonzero relative multiplier on the real three-torus, with based normalization and the required norm compatibility. Plane regularity does not provide periodic descent or identify that multiplier with the original arithmetic discrepancy.

Canonical cancellation on the plane closes a divisor obstruction while preserving the open comparison obligations.

Source anchors. v0.14: Conjugation regularity; Effect on the research target. v0.12: principal-norm rigidity hypotheses.

18 · Traditional, visual, Lean, and numerical scopes

Read the final set with its evidence boundaries

Layer	Evidence in the final set	Scope preserved
Integer transport	Universal Lean statements; exact finite replays	Coordinates, carries, weights and family ingredients
Complex analysis	Ordinary proofs in the traditional source	Divisor orders, cubic growth, convergence and reconstruction
Numerical diagnostics	Declared precision, limits and negative controls	Floating evidence; no new interval or infinite-product certificate
Arithmetic comparison	Independent candidate and retained modulus theorem	Exact phase and required periodic norm relation remain open

$$\mathrm{Im}(C_{\mathrm{pol}} U_\Gamma^3) = 0, \qquad C_{\mathrm{pol}} = \frac{\epsilon a_1 a_2^3}{\omega} \quad \text{remains open.}$$

The traditional companion gives the ordinary proofs, inherited assumptions, and remaining comparison route. The Lean companion identifies genuine compiled statements and their audited dependencies. The visual companion supplies finite examples and an exact regeneration script.

The figure control record checks all seven rational lifts on 2,197 integer triples, the growth families for $1 \le n \le 16$, and exact norm-incidence and polynomial coefficient identities. Numerical period and point coordinates use eighty working Decimal digits. None of this replaces an infinite analytic argument.

The fresh verification packet separately records source replay, independent exact checks, numerical diagnostics, and the final formal build scope. Existing floating regressions are not directed-rounding interval certificates. The guide performs no numerical gamma evaluation and no infinite canonical-product truncation.

The remaining scalar and periodic-norm comparison is still open. In particular the exact reality of the polarized gamma cube has not been established by the new canonical-product representation.

A complete final package records proved statements, finite evidence, arithmetic trust, and unresolved implications separately.

Source anchors. v0.14: Status; Effect on the research target; Verification and dependencies. Final Lean companion and verification packet.