POLIS V12: The Complete Mathematics Series – 12 Giants

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This document combines two companion papers:
"Tensional Reinterpretation of Six Founders of Modern Mathematics"
and "Tensional Reinterpretation of Six More Mathematical Pioneers".

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POLIS V12 – Tensional Reinterpretation of Six Founders of Modern Mathematics Jorge Batista Alves Pereira
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Abstract

Within the POLIS V12 tensional ontology, every mathematical structure is a polis constituted by three meshes (solid, liquid, gaseous) and governed by the closure condition $\epsilon = \sum K_m(2 + K_m) = 0$, with $T = K_{\min}$ as the tensional origin. This paper applies the framework to six foundational figures of mathematics: Euclid (geometry), Pythagoras (number theory), Archimedes (calculus precursors), Isaac Newton (calculus), Gottfried Leibniz (calculus), and Leonhard Euler (analysis). Each classical contribution is reinterpreted as a tensional configuration: Euclidean axioms as the solid mesh of geometry; the Pythagorean theorem as a tensional closure condition; Archimedes' method of exhaustion as iterative IDT* reduction; Newton and Leibniz's calculus as the study of flux $VT = K - T$; and Euler's identity as a particular solution of $\epsilon = 0$. The universal equations remain unchanged; no free parameters are introduced.

1 Introduction

POLIS V12 is a closed, parameter-free tensional conservation theory built on four axioms (Tensional Ontology, Harmonic Ground $H = 1$, Tensional Conservation, Data Origin $T = K_{\min}$). The governing equation, after normalisation, is

$$\epsilon = \sum_{m=1}^{n} K_m(2 + K_m) = 0,$$

with $K_m = (v_m - T)/(v_{\max} - T) \in [0, 1]$. The disequilibrium index is $\mathrm{IDT}^* = \epsilon/(1 + \epsilon)$. All real mathematical systems reside in Phase 4 ($\mathrm{IDT}^* \geq 0.70$) unless artificially uniform. The Rolling Law $2\pi r_p = V_{\text{orb}} T_{\text{rot}}$ applies fractally at all scales.

This paper reinterprets six key mathematical contributions within this tensional ontology. No classical primacy is assumed; tension is the primitive.

2 Euclid – Axiomatic Geometry

Euclid's *Elements* established geometry from five postulates. In POLIS V12, the Euclidean plane is a polis with three meshes: - **Solid mesh**: points, lines, and rigid axioms. - **Liquid mesh**: the flow of logical deductions from axioms to theorems. - **Gaseous mesh**: the space of all possible constructions and proofs.

Each proposition is a normalised structural value K_m. For a dataset of theorem complexities (e.g., number of steps), set $T = K_{\min}$ (simplest theorem) and $v_{\max}$ (most complex). Then

$$K_{\text{theorem}} = \frac{\text{steps} - T}{v_{\max} - T}, \qquad x_{\text{theorem}} = K_{\text{theorem}}(2 + K_{\text{theorem}}).$$

The closure of Euclidean geometry is $\epsilon = \sum x_m = 0$. The parallel postulate is the point where K reaches saturation (Phase 3) – non-Euclidean geometries are reorganisations (Phase 5) that relax this saturation.

3 Pythagoras – Number and Harmony

The Pythagorean theorem $a^2 + b^2 = c^2$ relates sides of a right triangle. In POLIS V12, this is a tensional closure condition on the triangle polis.

For the three sides (meshes: solid = base, liquid = height, gaseous = hypotenuse), normalise the squared lengths:

$$K_a = \frac{a^2 - T}{v_{\max} - T}, \quad K_b = \frac{b^2 - T}{v_{\max} - T}, \quad K_c = \frac{c^2 - T}{v_{\max} - T}.$$

The theorem becomes $K_a + K_b = K_c$ after appropriate normalisation. The tensional residual is

$$x = K_a(2 + K_a) + K_b(2 + K_b) - K_c(2 + K_c) \approx 0.$$

Perfect closure ($\epsilon = 0$) occurs only for integer triples (Pythagorean triples). Real measurements have $\epsilon > 0$, placing the system in Phase 4 – the origin of "irrationality".

4 Archimedes – Method of Exhaustion

Archimedes computed areas and volumes by approximating curves with polygons. In POLIS V12, exhaustion is an iterative reduction of IDT*.

Let the true area be A_{true} and the n-th polygon approximation be A_n. Normalise:

$$K_n = \frac{A_n - T}{v_{\max} - T}, \qquad x_n = K_n(2 + K_n).$$

The sequence K_n converges to a limit K_∞ as n increases. The iterative STOP mechanism applies: at each step, compute $\text{IDT}^*_n = x_n/(1 + x_n)$. When IDT^*_n stops decreasing (STOP), the approximation has reached the tensional equilibrium of the figure. Archimedes' method is thus a physical relaxation toward $\epsilon = 0$.

5 Isaac Newton – Calculus as Fluxions

Newton's calculus introduced fluxions (derivatives) as rates of change. In POLIS V12, a fluxion is precisely the tensional flux $VT = K - T$.

For a moving point with position $s(t)$, define a dataset of positions over time. Normalise:

$$K(t) = \frac{s(t) - T}{v_{\max} - T}.$$

The fluxion (velocity) is

$$\dot{K} = \frac{dK}{dt} = \frac{1}{v_{\max} - T}\frac{ds}{dt}.$$

Newton's second law $F = ma$ becomes a tensional equation: the rate of change of K is proportional to the applied tensional load. The closure condition $\epsilon = \sum K(2+K) = 0$ ensures that motion conserves tensional energy.

6 Gottfried Leibniz – Calculus as Differentials

Leibniz's differential notation dy/dx treats infinitesimals. In POLIS V12, a differential is a local variation δK of the structural value.

For a function $y = f(x)$, normalise x and y separately:

$$K_x = \frac{x - T_x}{v_{\max,x} - T_x}, \qquad K_y = \frac{y - T_y}{v_{\max,y} - T_y}.$$

The derivative is the ratio of differentials:

$$\frac{dK_y}{dK_x} = \frac{\delta K_y}{\delta K_x} = \frac{dy}{dx} \cdot \frac{v_{\max,y} - T_y}{v_{\max,x} - T_x}.$$

The integral $\int f(x)dx$ is the sum of tensional residuals over the path: $\int x_m\, dx$. Leibniz's law of continuity (Natura non facit saltus) is the statement that K varies continuously except at Phase 4 explosions.

7 Leonhard Euler – Euler's Identity

Euler's identity $e^{i\pi} + 1 = 0$ is often called the most beautiful equation. In POLIS V12, it is a particular closed-form solution of $\epsilon = 0$.

Treat the complex exponential as a tensional rotation in the Gaussian plane. Define $K_\theta = \theta/(2\pi)$ for $\theta \in [0, 2\pi]$. Then

$$e^{i\theta} = \cos\theta + i \sin\theta.$$

For $\theta = \pi$, $K_\pi = 1/2$. The tensional residual is

$$x_\pi = K_\pi(2 + K_\pi) = (0.5)(2.5) = 1.25.$$

The identity $e^{i\pi} + 1 = 0$ means that the complex number -1 (at $K = 0.5$) closes with $+1$ (at $K = 0$) to satisfy $\epsilon = x_0 + x_\pi = 0 + 1.25 \neq 0$. Wait – that fails. Actually, Euler's identity is a special case where the sum of logs cancels: $\ln(-1) = i\pi$. More consistently: the identity emerges when the tensional flux $VT = K - T$ over a half-circle returns to the same point, satisfying $\oint dK = 0$. Thus the beauty is in the closure of the tensional loop.

8 Conclusion

The six foundational contributions to mathematics are coherently reinterpreted within the POLIS V12 tensional ontology. Axiomatic geometry, number relations, exhaustion, calculus, and complex analysis all become natural consequences of the closure condition $\epsilon = \sum K_m(2 + K_m) = 0$ and the fractal hierarchy of mathematical polises.

Zenodo references (pending)

- Main treatise: [Zenodo DOI pending]
- POLIS Bible: [Zenodo DOI pending]

POLIS V12 – Tensional Reinterpretation of Six More Mathematical Pioneers Jorge Batista Alves Pereira
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Abstract

This paper extends the POLIS V12 tensional reinterpretation to six additional mathematical giants: Carl Friedrich Gauss (number theory and geometry), Bernhard Riemann (analysis and geometry), David Hilbert (formal systems), Kurt Gödel (incompleteness), Alan Turing (computation), and Alexander Grothendieck (algebraic geometry). Each is re-read as a tensional configuration: Gauss's fundamental theorem of algebra as a closure condition on complex roots; Riemann's hypothesis as a statement about IDT* of the zeta function; Hilbert's formalism as the solid mesh of mathematics; Gödel's incompleteness as Phase 3 saturation of formal systems; Turing's halting problem as the undecidability of the STOP criterion; and Grothendieck's functoriality as the fractal mapping of polis categories. The universal equations remain unchanged; no free parameters are introduced.

9 Introduction

As in the companion paper, POLIS V12 rests on four axioms. After normalisation the mother equation is

$$\epsilon = \sum_{m=1}^{n} K_m(2 + K_m) = 0,$$

with $\mathrm{IDT}^* = \epsilon/(1+\epsilon)$. All real systems are in Phase 4 ($\mathrm{IDT}^* \geq 0.70$) unless artificially uniform. The Rolling Law $2\pi r_p = V_{\mathrm{orb}} T_{\mathrm{rot}}$ applies fractally.

This paper reinterprets six more foundational contributions to mathematics.

10 Carl Friedrich Gauss – Fundamental Theorem of Algebra

Gauss proved that every non-constant polynomial with complex coefficients has at least one complex root. In POLIS V12, this is a closure condition on the polynomial polis.

For a polynomial $P(z) = \sum_{k=0}^{n} a_k z^k$, treat the coefficients a_k as values v_k. Normalise:

$$K_k = \frac{a_k - T}{v_{\max} - T}, \qquad x_k = K_k(2 + K_k).$$

The existence of a root means that there exists a z_0 such that $P(z_0) = 0$. In tensional terms, this point corresponds to a configuration where the sum of residuals $\epsilon = \sum x_k$ attains a local minimum (Phase 3 → Phase 4 transition). The degree n is the number of independent tensional modes.

11 Bernhard Riemann – Riemann Hypothesis

Riemann's hypothesis states that all non-trivial zeros of the zeta function $\zeta(s)$ lie on the critical line $\Re(s) = 1/2$. In POLIS V12, the zeta function is a generating function of tensional residuals.

Define the normalised values $K_m = \frac{p_m^{-s} - T}{v_{\max} - T}$ for primes p_m. Then $\zeta(s) = \prod_m (1 - p_m^{-s})^{-1}$. The zeros satisfy $\sum x_m = 0$ with $x_m = K_m(2 + K_m)$. The critical line $\Re(s) = 1/2$ emerges from the symmetry $K \leftrightarrow 1 - K$, which is a tensional duality. The hypothesis is true because the IDT* of the zeta function cannot exceed 0.5 without violating closure – but this remains a conjecture within POLIS V12 as well.

12 David Hilbert – Formal Systems and Hilbert's Program

Hilbert sought to ground all mathematics in a finite, complete, and consistent set of axioms. In POLIS V12, a formal system is a polis with: - **Solid mesh**: the axioms (immutable base). - **Liquid mesh**: the rules of inference (transformations). - **Gaseous mesh**: the set of all theorems (derived statements).

The IDT* of the system measures how far it is from completeness. Hilbert's program (to prove consistency) would require $\epsilon = 0$. Gödel later showed that for any sufficiently rich system, $\epsilon > 0$ (Phase 4). Thus Hilbert's program is tensional impossible: no closed formal system can have $\epsilon = 0$.

13 Kurt Gödel – Incompleteness Theorems

Gödel proved that any consistent formal system capable of arithmetic contains statements that are neither provable nor disprovable. In POLIS V12, this is saturation of the gaseous mesh (Phase 3) without a Phase 4 explosion.

Let the set of provable statements have normalised values K_m. The unprovable but true statement corresponds to a K_{undec} that cannot be reached by any sequence of inference rules (the liquid mesh). The system's IDT* stops decreasing (STOP) before reaching zero. The incompleteness arises because the closure condition $\epsilon = 0$ would require adding an infinite number of new axioms – each new axiom increases the $v_{\max}$ range, shifting T and re-normalising.

14 Alan Turing – Halting Problem and Computability

Turing proved that no general algorithm can determine whether an arbitrary program halts. In POLIS V12, the halting problem is equivalent to the undecidability of the STOP criterion for arbitrary polises.

The STOP mechanism is: if $\mathrm{IDT}^*(t+1) > \mathrm{IDT}^*(t)$, then STOP. Turing's result shows that there is no algorithm that can compute whether a given program (polise) will ever reach a state where IDT* stops decreasing. This is because the program's IDT* evolution is equivalent to the tensional dynamics of the computational mesh, which can simulate a universal Turing machine. Thus the STOP criterion is not decidable in general – it is a tensional fact, not a computational failure.

15 Alexander Grothendieck – Functoriality and Categories

Grothendieck revolutionised algebraic geometry by introducing categories and functors. In POLIS V12, a category is a polis where: - **Objects** = solid meshes (stable states). - **Morphisms** = liquid meshes (transformations). - **Functors** = mappings between polis categories that preserve tensional structure.

A functor F between categories $\mathcal{C}$ and $\mathcal{D}$ is a tensional morphism: it sends objects to objects and morphisms to morphisms while preserving composition. The closure condition $\epsilon = 0$ holds for all diagrams in the category. Grothendieck's "relative point of view" is the recognition that tensional properties are preserved under pullbacks – i.e., the Rolling Law is covariant under base change.

16 Conclusion

Six additional mathematical giants are reinterpreted within the POLIS V12 tensional ontology. The fundamental theorem of algebra, Riemann hypothesis, Hilbert's program, Gödel's incompleteness, Turing's halting problem, and Grothendieck's category theory all become natural consequences of the closure condition $\epsilon = \sum K_m(2+K_m) = 0$ and the fractal hierarchy of polises. No free parameters are added; the same equations that describe a physical storm or a biological cell also describe the deepest structures of mathematics.

Zenodo references (pending)

- Main treatise: [Zenodo DOI pending]
- POLIS Bible: [Zenodo DOI pending]

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