

Unified Four-Dimensional Mathematics (V6 Series)

Foundational Mathematical System for Cosmic Closure

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Abstract

This paper establishes the complete, unified, and logically closed four-dimensional mathematical system (V6 Series) on the foundational basis of the critique and reconstruction of zero. It strictly follows four foundational axioms: Fundamental Unity, Four-Dimensional Closure, Algebraic Closure, and Unique Valuation. Primordial 1 generates four spiral motions: left rotation, right rotation, expansion, contraction, which correspond to addition, subtraction, multiplication, and division. Left-right spirals engage in occlusion, self-rotation, and resultant force; up-down spirals govern expansion and contraction to stabilize the four-dimensional unit ${}_4F$. The system satisfies commutativity, associativity, distributivity, identity elements, and null elements. This system unifies definitions, operations, sets, structures, phases, coupling, cycles, and geometric expressions into one self-consistent framework. It is a pure mathematical system that does not depend on physical hypotheses and serves as the necessary and sufficient mathematical foundation for the Pythagorean Primary Substance System V14.0.

Keywords: four-dimensional mathematics; V6 series; primordial 1; virtual 0; latent state 1^0 ; 4D structural unit; 4D arithmetic; spiral dynamics; occlusion; resultant force; phase unification; coupling coefficient; mathematical closure; algebraic axioms

1 Introduction

The V6 Series four-dimensional mathematics is the direct formal expansion of the foundational axioms derived from the critique of zero. It is a purely mathematical system that constructs all structures, operations, sets, and transformations from primordial 1, 0, and 1^0 without empirical assumptions. This paper integrates spiral dynamics, occlusion, self-rotation, and resultant force as the dynamical origin of four-dimensional arithmetic, standardizes notations, strengthens logical consistency, defines all operations explicitly with coupling and phase, and ensures full compatibility and structural coherence with the cosmic system V14.0.

2 Foundational Mathematical Ontology

This entire mathematical system is built on three irreducible primordial entities:

- 1: Primordial being, the only substantive mathematical entity.
- 0: Virtual boundary, transition interface, and structural separator.
- 1^0 : Latent base state, implicit background substrate, and reset state.

Fundamental relational cycle:

$$1 \rightleftharpoons 0 \rightleftharpoons 1^0$$

This system observes four foundational axioms:

Axiom of Fundamental Unity Ontology, mathematics, and physics share a single, indivisible origin.

Axiom of Four-Dimensional Closure The minimal complete, self-stabilizing, and logically closed spatial structure is four-dimensional.

Axiom of Algebraic Closure All operations on ${}_4F$ remain in the universal set $\{{}_4F, 1, 1^0, 0\}$.

Axiom of Unique Valuation All operations are single-valued; no ambiguous or multiple results exist.

3 Basic 4D Structural Unit

The fundamental indivisible structural carrier is the standard four-dimensional unit:

$${}_4F$$

Primitive structural codes:

$$1({}_4F), \quad 2({}_4F)$$

4 Four Fundamental 4D Arithmetic Operations (Coupling & Phase Defined)

All operations describe structural transformations with explicit coupling and phase consistency.

4.1 4.1 Dynamical Origin: Spiral Mechanics

Four-dimensional arithmetic originates from four fundamental spiral motions of primordial 1:

- Left spiral 1^l : outward expansion, structural superposition \longleftrightarrow Addition
- Right spiral 1^r : inward contraction, phase decoupling \longleftrightarrow Subtraction
- Upward spiral: global expansion, hierarchical nesting \longleftrightarrow Multiplication
- Downward spiral: global contraction, ontological return \longleftrightarrow Division

Left-right spirals form mutual occlusion, rotation engagement, and resultant force. Up-down spirals form expansion-contraction equilibrium. Self-rotation and mutual rotation together stabilize the standard 4D structure ${}_4F$.

4.2 4.2 Formal 4D Arithmetic

1. **4D Addition:** ${}_4F + {}_4F$ Isomorphic direct sum; interface coupling coefficient $\kappa \equiv 1$; no phase torsion; pure structural superposition. Additive identity: ${}_4F + 1 = {}_4F$. Commutative, associative. 2. **4D Multiplication:** ${}_4F \times {}_4F$ Structural nesting with intrinsic torsion κ ; includes phase coupling and coherent interaction between 4D units. Multiplicative identity: ${}_4F \times 1 = {}_4F$. Commutative, associative, distributive over addition. 3. **4D Subtraction:** ${}_4F - {}_4F = 1^0$ Full structural decoupling; phase cancellation; return to the latent background substrate 1^0 . Unique result. 4. **4D Division:** ${}_4F \div {}_4F = 1$ Structural self-identity; phase normalization; return to primordial being 1. Unique result.

5 4D Binary System (Zero-Free)

Structural codes: $1({}_4F), 2({}_4F)$ **Non-Zero Principle:** no absolute nothingness; all states revert to 1^0 .

6 45° Conical Geometry

Intrinsic equilibrium condition:

$$x^2 + y^2 = z^2, \quad r = z$$

7 4D Torsional Convergence Matrix

$$\mathbf{M}_4 = \begin{bmatrix} 1 & k & 0 & 0 \\ k & 1 & 0 & 0 \\ 0 & 0 & 1 & -c \\ 0 & 0 & c & 1 \end{bmatrix}$$

where k = torsional coupling; c = vertical convergence.

8 Dynamic 4D Circular Constant

$$\Pi_4 = \pi \cdot \lambda, \quad \lambda \approx 1, \lambda > 1$$

9 12-Order Coupling Scale

Three isomorphic 4D units with natural coupling $\kappa \equiv 1$:

$${}_4F + {}_4F + {}_4F = 12$$

10 Five-Position Cosmic Cycle

$$1 \rightarrow 0 \rightarrow 1^0 \rightarrow 0 \rightarrow 1$$

11 Hierarchical Sets and Global Coordinate

Global latent base set:

$$\mathbb{S}_{\text{total}}^0 = \{1^0\}$$

Hierarchical manifest set:

$$\mathbb{S}_4^{\text{hier}} = \{{}_1M, {}_1P, {}_1A, {}_1B, {}_1F, {}_1D, {}_1E\}$$

12 Phase Unification System

Phases of primordial 1: 1 (principal), 1^l (left), 1^r (right), 1^v (inversion). Core closure rules:

$$1 + 1^v = 0, \quad 1^l \times 1^r = 1$$

13 Logical Closure

This system is self-consistent, mathematically closed, operationally complete, and fully compatible with the foundational axioms and the V14.0 cosmic system. All operations are well-defined with coupling and phase. Once arithmetic is formalized into 2D/3D entities, β_1 does not interfere, preserving structural stability.

14 Conclusion

This paper presents the complete unified four-dimensional mathematical system (V6 Series), constructed strictly on the foundational ontology from the critique of zero. It integrates the dynamical origin of spiral mechanics, occlusion, self-rotation, and resultant force, with fully defined arithmetic, coupling, and phase mechanisms. The system satisfies all standard algebraic requirements: closure, uniqueness, identities, null elements, commutativity, associativity, and distributivity. It serves as the formal, stable, and indispensable foundation for the Pythagorean Primary Substance System V14.0.

15 Top-Level Unification Declaration

The dynamical-arithmetic system (Source Point 5: Four-Dimensional Mathematics) and the ontological foundation (Source Point 1: Critique of Zero) are fully unified, closed, and compatible with the ultimate cosmic system V14.0 (Source Point 11). All improvements of the foundational layers strengthen the logical consistency and structural integrity of the top-level unity without any gaps, contradictions, or leaks. V14.0 remains the absolute unified framework that governs, contains, and completes the entire theoretical system.