PAST KNOWLEDGE PEOPLE

ISSN: 2834-7706

Review Article

Journal of Mathematical Techniques and Computational Mathematics

The Independent Circular Geometric Number System (ICGNS): Redefining Numbers Through the Relation Between Radius and Angle

Dr. Walid Nabil*

Cairo University, Geography Department, Cairo, Egypt

***Corresponding Author**
Walid Nabil, Cairo University, Geography Department, Cairo, Egypt.

Submitted: 2025, Dec 30; **Accepted:** 2026, Feb 02; **Published:** 2026, Feb 17

Citation: Nabil, W. (2026). The Independent Circular Geometric Number System (ICGNS): Redefining Numbers Through the Relation Between Radius and Angle. *J Math Techniques Comput Math, 5*(2), 01-09.

Abstract
This paper introduces a fully new numerical framework, the Independent Circular Geometric Number System (ICGNS), which redefines the concept of a number by transforming it from a one-dimensional linear value into a two-dimensional geometric entity within a circular space. In this system, every number is represented by three fundamental components: the logarithmic magnitude level (r), the angular phase (θ), and the sign (s), forming a unique radial point across a set of concentric circular layers. Unlike the classical geometric interpretation of complex numbers, the proposed system does not use geometry merely as a visualization tool. Instead, it provides a genuine circular number system capable of generating, classifying, and relating numbers through intrinsic radial–angular structures. The paper formulates the core transformation functions between the linear and circular domains, presents the rules for multiplication, addition, and geometric distance within the system, and provides practical examples demonstrating the circular distribution of natural numbers and multi-digit values such as calendar years. The study reveals that ICGNS offers strong explanatory power for periodic and wave-like patterns and has potential applications in mathematics, physics, astronomy, geography, data science, and signal analysis. The paper also discusses theoretical limitations of the system and shows how these limitations form natural pathways for future development, including algorithmic implementations and computational libraries based on circular numerical representation. Thus, ICGNS lays the foundation for a new numerical paradigm that re-conceptualizes the nature of numbers and opens novel research directions across mathematical and scientific disciplines.

Keywords: Circular Number System, Radial–Angular Representation, Logarithmic Radius, Numerical Phase, Geometric Number Theory, Non-Linear Number Systems, Numerical Mapping, ICGNS

1. Introduction

This paper introduces a novel numerical framework termed the *Independent Circular Geometric Number System* (ICGNS). The proposed system attempts to redefine the notion of a number by transforming it from a one-dimensional linear representation into a radial geometric entity determined by two primary variables: the radius **"r"**, which reflects the magnitude level, and the angle **"θ"**, which denotes its position within a unified numerical circular cycle.

ICGNS is founded on the hypothesis that a number need not be confined to its quantitative placement along a single axis; rather, it can be conceived as a location within a two-dimensional circular space in which magnitude and phase integrate into a single geometric structure. Consequently, the number ceases to be a fixed symbol and becomes an indexed point within consecutive concentric rings, each of which represents an independent logarithmic level [1].

This idea draws inspiration from the historical development of geometric representations of numbers, such as the complex-number formalism of Euler and Gauss, yet it does not reproduce those models. Whereas earlier works applied geometry as a means of representing preexisting numbers, the present research proposes a system that *generates* and *classifies* numbers through their radial structure. Thus, ICGNS is not merely a pictorial scheme; it constitutes an autonomous numbering system endowed with its own transformation laws, operations, and distance measures.

The objective of this study is to establish an alternative mathematical framework applicable to the analysis of periodic and wave-like phenomena, to characterize nonlinear numeric relations, and to provide new analytic tools relevant to physics, astronomy, geography, and data science. In the following sections, we present the governing equations of the system, the transformation functions between linear and circular domains, and illustrative examples that demonstrate how numbers are positioned within angular rings and how novel **numerical analogues** (or "Counterparts") emerge from this representation.

2. Essence of the Idea: The Mathematical Philosophy of "ICGNS"

The Independent Circular Geometric Number System (ICGNS) is built upon a fundamental shift in the way numbers are represented. Instead of viewing a number as a linear value located along a one-dimensional axis, ICGNS defines each number as a radial point in a unified circular geometric space characterized by two essential variables:

- **The radius r**, representing the logarithmic magnitude level.
- **The angle θ**, denoting the number's position within the angular cycle.

Through this transformation, the number no longer functions as a simple element in a linear sequence (1, 2, 3, …). Rather, it acquires a geometric identity composed of a radial level and an angular phase, enabling numerical relationships to be interpreted from a circular or wave-like perspective rather than a strictly linear one. In this framework, geometry is not merely a visualization tool; it becomes the structural basis upon which numbers are generated, classified, and redistributed across concentric rings, giving rise to **numeric analogues** derived from radial relationships within the circle.

This conceptual shift introduces a nonlinear numerical architecture that can be applied to the study of periodic structures, oscillatory phenomena, and complex mathematical patterns that transcend the conventional linear interpretation of numbers.

2.1. Originality of the Concept

The foundational idea underlying the Independent Circular Geometric Number System (ICGNS) demonstrates a high degree of originality and conceptual innovation. To the best of our knowledge, no previous work in the mathematical literature has attempted to construct a standalone number system in which the radius r and the angle θ constitute the primary defining components of the number itself—rather than merely serving as a representation of an existing numerical entity. While **"Euler"** and **"Gauss"** (*Table 1*) employed geometric frameworks to illustrate relationships between the real and imaginary parts of complex numbers, those contributions did not introduce a new numbering system; they provided a visualization tool for numbers already defined [2].

In contrast, the system proposed in this study introduces a fundamentally different paradigm: it redefines the number as a radial point endowed with an intrinsic structural identity consisting of

(1) a logarithmic level **r**
(2) an angular phase **θ**
(3) a sign **s**.

In this formulation, a number is not a position on a linear axis but a geometric entity emerging within a circular space. This allows for the derivation of **novel numerical analogues** generated through the radial–angular relations of the system—an idea that has not appeared in any known numerical framework.

The originality of ICGNS stems from three major pillars:

- **A structural transformation of numerical value**, shifting from a linear axis to a two-dimensional radial domain—an unprecedented step in the history of number systems.
- **The creation of new numerical analogues,** arising from angular and ring-based symmetries rather than from simple re-encoding of conventional values.
- **The establishment of an autonomous numbering system,** complete with its own transformation laws, operational rules, and geometric distance functions, suggesting the emergence of a new mathematical discipline based on circular geometry of numbers.

Accordingly, ICGNS represents a conceptual transition from "Geometry as a tool for representing numbers" to "Geometry as a means of generating numbers," marking it as one of the most innovative contributions to contemporary numerical theory.

Item	**Gauss's Representation (Complex Numbers)**	**Proposed Idea (Circular Geometric Numbering – ICGNS)**
Purpose	Geometric representation of complex numbers	Establishing a new and independent numbering system
Core Components	Real part and imaginary part	Radius (distance) and angle representing the value itself
Primary Use	Mathematical analysis and equation solving	Counting, arithmetic operations, and geometric representation of all numbers
Nature of the System	A branch of complex analysis	An alternative numbering system to the decimal system

Founders	Euler and Gauss	The author (a novel, previously undocumented innovation)
Source: *"The original geometric interpretation of complex numbers is attributed to Euler (1748) and Gauss (1831), as discussed in Stillwell (2010) and Nahin (2018)."*		

Table 1: Comparison Between Gauss's Complex Representation and the Proposed ICGNS System

2.2. Did a Circular Numbering System Ever Exist in History?

A survey of historical numeral systems reveals that, despite the richness and diversity of symbolic traditions across civilizations, **no fully developed circular numbering system** has ever been documented—one in which a number is defined through a coordinated relationship between radius and angle. All known numeral systems, from the Babylonian and Roman to the decimal and binary systems, rely fundamentally on **linear positional structures** for constructing numerical value [3].

Nevertheless, certain historical uses of circular forms did appear, though none reached the level of a mathematically defined numbering system:

i. Maya and Aztec Civilizations

Circular motifs were employed in calendrical cycles and astronomical computations. However, these were representations of time and cosmic cycles, not geometric definitions of numbers themselves [4].

ii. Islamic Astronomical Tradition

Scholars produced circular astronomical tables (e.g., al-Biruni, 11th century), where values were arranged within geometric circles. Yet these served merely as display frameworks and did not constitute a numbering system with transformation laws or arithmetic operations [5].

iii. Pythagorean Philosophy

The "Tetractys" and circular arrangements were used as symbolic representations of cosmic harmony, not as numerical systems that define numbers through radius–angle relationships [6].

Consequently, no historical precedent demonstrates a system in which the circle is treated as a **foundational numerical structure**, nor one in which a number is generated from its radial and angular coordinates. Within this context, the Independent Circular Geometric Number System (ICGNS) represents—based on available literature—the **first documented attempt** to establish a complete circular numbering framework with its own components, equations, and operational rules.

This distinction highlights the originality of ICGNS: it transforms the circle from a descriptive tool into a **generative mechanism for numerical identity**, making geometry the basis for defining value rather than merely depicting it.

3. Mathematical Symbol of the ICGNS System

The Independent Circular Geometric Number System (ICGNS) possesses a distinct geometric symbol that captures the radial structure on which the system is built. This symbol consists of one or more **concentric circles** intersected by two perpendicular axes (*Fig 1*) (a horizontal and a vertical axis) passing through the center, providing a clear reference framework for defining angular orientation and radial levels.

This geometric configuration reflects the core principle of the system:

Each number is represented as a radial point defined by a radius r and an angle **θ**, positioned within a series of concentric circular rings corresponding to different magnitude levels. In this formulation, the number is no longer a linear scalar but a **geometric entity** with a meaningful location in a repetitive circular domain.

The geometric symbol constitutes the conceptual foundation from which the system's equations, transformation rules, and operational structures are derived, since the radial–angular relationship (**r,θ**) forms the defining identity of numbers within ICGNS.

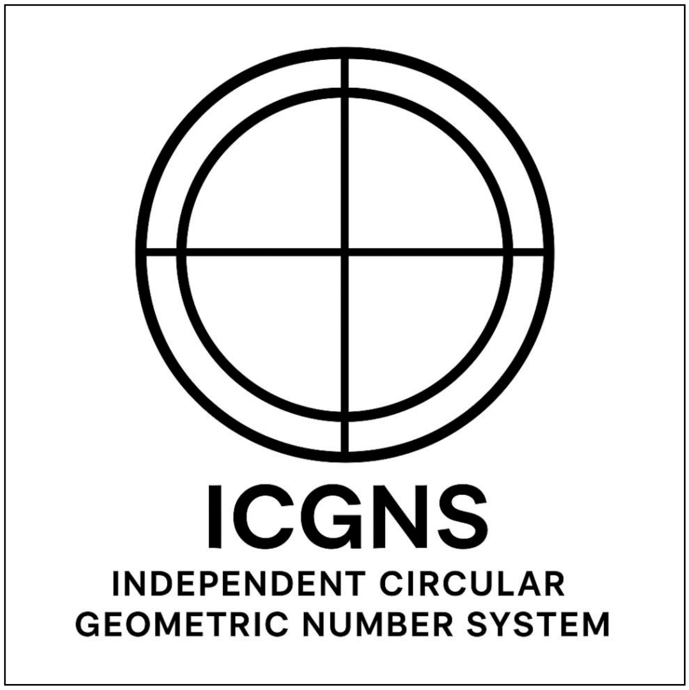

Figure 1: The Default Representation of The Mathematical Symbol Used to Denote (Icgns) Is A Circle Within A Concentric Circle, With A Longitude Line and A Latitude Line Passing Through the Center Of The Circle

3.1. Fundamental Mathematical Formulation

The ICGNS framework relies on a fundamental transformation function that maps a conventional linear value V into its radial representation within the circular domain. This transformation proceeds through the following structured steps:

I. Computing the logarithmic magnitude of the value.
II. Determining the ring index (logarithmic level).
III. Extracting the fractional component that determines the number's position within the cycle.
IV. Converting this fractional part into an angular position on the circle.
V. Assigning the sign to fix the direction of the radial vector.

The core transformation is defined as:

sign(V)= $2\pi\ \varphi$
s = r
$\theta - L = \varphi$
$\lfloor L \rfloor = \log B(|V|)$
r = L

Thus, the number is represented in the system as:
$(s,r,\theta) = M(V)$

The inverse transformation is given by:

$^{r+\theta/(2\pi)}B.s = M^{-1}(s,r,\theta)$

These relations form the mathematical backbone of the system, providing the basis for defining arithmetic operations—such as multiplication, addition via vector transformation, and geometric distance—within the circular numerical framework.

3.2. Arithmetic Operations in the ICGNS System

Arithmetic operations in the Independent Circular Geometric Number System (ICGNS) differ fundamentally from operations in traditional linear systems, owing to the radial, logarithmic, and angular nature of the framework. The system defines two principal operations: **multiplication** and **addition via vector transformation.**

3.2.1. Multiplication

Multiplication in ICGNS is performed by **adding the logarithmic magnitudes** of the two numbers and then reconstructing the radial components (radius and angle). The core relation is:

$. \,_2L + \,_1L = \,_{12}L$
$_i2\pi\ \varphi = \,_ir_i,\ \theta - \,_iL = i\varphi,\ \lfloor_i L\rfloor = \,_i\log B\ (|V_i|),\ r = \,_iL$

the resulting components are:

$,\ _2L_1 + L = \,_{12}L$
$,\ =\lfloor_{12}L\rfloor = \,_{12}r$
$,\ _{12}L12 - r = \,_{12}\varphi$
$,\ _{12}2\pi\ \varphi = \,_{12}\theta$
$,\ _2s1\ .\ s = \,_{12}s$

Hence,

$.(_{12}s\ _{12},\ r_{12},\ \theta\ ) = M\ (V_1V_2)$

Multiplication is therefore **fully closed** within the circular geometric structure of the system.

3.2.2. Addition

Unlike multiplication, **addition is not inherently closed** within the circular domain due to the geometric distribution of values. Consequently, addition is performed by converting each number into its Cartesian representation, summing the resulting vectors, and then reconverting the output to the ICGNS format.

Procedure:

i.. Compute each magnitude:

$$.^{r_i+\theta_i/(2\pi)} B = |_i V|$$

ii. Convert to Cartesian coordinates:

$$. (|_i V_i| \cos \theta_i, |V_i| \sin \theta_i |) = p(V_i)$$

iii. Perform vector addition:

$$. (x,y) = p(_2V) + p(V_1) = {}_{sum}p$$

iv. Extract magnitude and angle:

$$._{atan}2(y,x) = {}_{sum}\theta , \sqrt{}_2 x_{2+y} = |_{sum}V|$$

v. Convert back to ICGNS representation:

$$._{sum}2\pi\varphi = {}_{sum}r\ {}_{sum}, \theta - {}_{sum}L = {}_{sum}\varphi , \lfloor_{sum}L\rfloor = {}_{sum}\log_B(|V^{sum}|) , r = {}_{sum}L$$

This vector-based approach enables addition to be performed consistently within the circular numerical structure.

3.3. Distance Metric in the ICGNS System

The concept of distance between two numbers in the Independent Circular Geometric Number System (ICGNS) is fundamental for analyzing the structural relationships within the circular domain. Since each number is represented as:

$$, (s, r, \theta) = M(V)$$

the notion of distance cannot rely on linear subtraction as in traditional number systems. Instead, it must incorporate:

a. Angular separation,

b. Layer (ring) difference,

c. Direction (sign).

Thus, distance is defined using the geometric interpretation of each number through its Cartesian coordinates.

i. Conversion to Cartesian Coordinates

For each number:

$$^{r+\theta/(2\pi)} B = |V|$$

then:

$$.V | \sin \theta| = V | \cos \theta, y | = x$$

ii. Distance Between Two Numbers

For two numbers:

$$,(_2s_2,r_2,\theta) = M(V_2) , (_1s_1,r_1,\theta) = M (V_1)$$

the ICGNS distance metric is defined as:

$$. \sqrt{}^2(_2y_1 - y) + {}^2(_2x_1 - x) = dICGNS(V_1,V_2)$$

This expression represents the **geometric Euclidean distance** between the two radial points within the circular structure of the system (*Table 2*).

Why this metric?

Because:

- The angle specifies the number's position within the cycle.
- The radius corresponds to its logarithmic magnitude level.
- Cartesian distance preserves the **geometric integrity** of the system, avoiding inconsistencies that arise from comparing heterogeneous linear values.

This metric enables the study of:

- Number distribution patterns
- Clustering properties
- Divergence between values
- Path structures
- The internal geometry of the ICGNS framework

Ultimately providing a foundation for potential applications in data science, complex systems, and AI.

Symbol	Name	Mathematical Definition	Geometric Meaning / Interpretation
(V)	Numerical value	Traditional linear representation of the number	The original value prior to circular transformation
(	V	)	Absolute value
B	Logarithmic base	e typically 10 or; 1B	Determines the number of rings per magnitude doubling
L	Logarithmic magnitude	) L = \log_{B}(	V

R	Integer part of (L)	⌊L⌋ = r	Ring index (concentric circular layer)
φ	Fractional part of (L)	(r -L) = φ	Position of the number within the current cycle
Θ	Radial angle	2πφ = θ	Angular orientation of the number in the circular domain
(s)	Sign of the number	sign(V) = s	Determines the direction of the radial vector
(M(V)	Forward mapping	(s,r,θ) = M (V)	Mapping from linear space to circular geometric space
$^{1-}$M	Inverse mapping	$^{r+\theta/(2\pi)}$B.s = $M^{-1}(s,r,\theta)$	Recovering the original number from the circular form
p(V)	Cartesian vector	) p(V) =)	V
$d(V_1,V_2)$	Radial distance	. $\sqrt{}^2({}_2y_1 - y) + {}^2({}_2x_1 - x) = d$	Euclidean distance between two numbers in the circular domain
$_2L$, $_1L$	Logarithmic magnitudes	(L_i = \log_B(	V_i
$_{12}r$ $_{12}$, θ_{12},s	Multiplication parameters	Derived from $_2L+{}_1L={}_{12}L$	Results of multiplication in ICGNS
π	Pi (circle constant)	π≈ 3.1415926535)	Used for full angular transformation
2π φ	Full circular phase	2π φ = θ	Complete angular phase of the number
Σ	Sigma (summation)	$_i\Sigma X$	Used for summation of multiple values or vectors
$_pR$	Resultant vector	$p(V_2) + p(V_1) = {}_pR$	The geometric point resulting from vector addition
iV	Sub-value	The i-th value in an operation	Individual element used in arithmetic operations
Δθ	Angular difference	$_2\theta - {}_1\theta = \Delta\theta$	Angular separation between two numbers
cos(Δθ)	Cosine of angular difference	—	Measures directional similarity of the two numbers
—	Source	—	Prepared by the author

Table 2: Fundamental Mathematical Symbols in the Independent Circular Geometric Number System (ICGNS)

4. Application Examples of Number Transformation in ICGNS

Application examples play a crucial role in demonstrating how the Independent Circular Geometric Number System (ICGNS) operates in practice. They illustrate the full transformation workflow—from the linear representation of the number to its radial coordinates within the circular domain. These examples confirm that the system is not merely a theoretical construct but a functional computational framework.

4.1. Example: Transforming Numbers 1–10

For each number V, the transformation steps are:

,sign(V) = 2πφ , s = r, θ− L= φ , ⌊L⌋ = logB (|V|), r = L
. (s,r,θ) = M (V)

Example:
1 = V
, 0 = θ , 0 = φ , 0 = r , 0 = L
. (0,0,1) = M (1)

Example:
2 = V
,rad 1.890,0,1 = θ , 0 = r , 0.3010 = L
.(1.890,0,1) = M (2))

Example: (***Table 3***)
10 = V
,0 = θ ,1 = r , 1 = L
.(0,1,1) = M(10)

4.2. Example: Transforming the years 2025, 2026, 2027

For
2025 = V
.rad 1.925 = θ ,3 = r , 3.30637 = L
For
2026 = V
.rad 1.928 = θ ,3 = r , 3.30693 = L
For
2027 = V
.rad 1.931 = θ ,3 = r , 3.30754 = L

These results show that:

- All three values lie in **the same ring** (3 = r).
- Their angular positions increase gradually, indicating **adjacent geometric positions** within the ICGNS circular domain.

5. Geometric Representation of Numbers in ICGNS

The Independent Circular Geometric Number System (ICGNS) maps every numerical value into a geometric point within a circular radial space. This transformation reveals structural relationships between numbers that are not visible in traditional linear number lines.

The geometric representation relies on three essential components:

1. **Angular position** through **θ.**
2. **Ring index** through **r.**
3. **Sign direction** through **s.**

Thus, each number becomes a directed radial vector emerging from the center, with its orientation and ring determined by its logarithmic magnitude.

Number (V)	(L)	(r)	φ	θ	(M(V))
1	0	0	0	0	(1,0,0)
2	0.3010	0	0.3010	1.890	(1,0,1.890)
3	0.4771	0	0.4771	2.997	(1,0,2.997)
4	0.6020	0	0.6020	3.781	(1,0,3.781)
5	0.6990	0	0.6990	4.389	(1,0,4.389)
6	0.7781	0	0.7781	4.889	(1,0,4.889)
7	0.8451	0	0.8451	5.309	(1,0,5.309)
8	0.9030	0	0.9030	5.671	(1,0,5.671)
9	0.9542	0	0.9542	6.0	(1,0,6.0)
10	1	1	0	0	(1,1,0)

Table 3: Geometric Distribution of Ten Sample Numbers (1 - 10), (Fig 2)

6. Disadvantages and Theoretical Limitations of the ICGNS System

Although the Circular Independent Number System (ICGNS) possesses numerous innovative features, its reliance on a geometric logarithmic foundation imposes a set of theoretical limitations. This section aims to present these limitations in a clear (***Table 4***), scientific manner, thereby aiding in understanding the system's boundaries and future development directions.

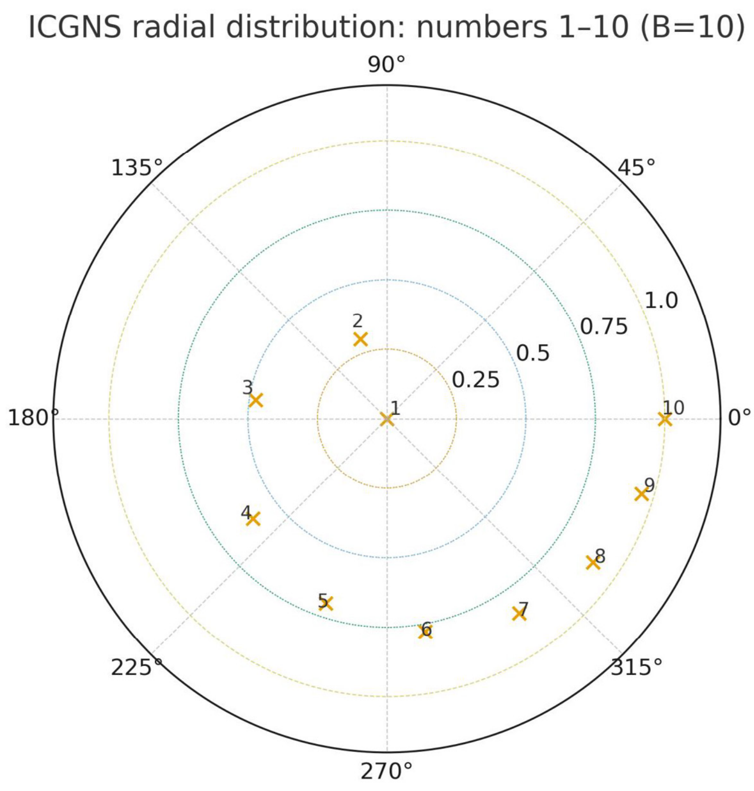

Figure 2: Radial Distribution of Numbers 1–10

Figure 2 illustrates the radial placement of numbers from 1 to 10 within the ICGNS circular space. Numbers 1–9 occupy the first ring r=0, while 10 appears in the second ring r=1, indicating the beginning of a new logarithmic cycle.

No.	Type of Limitation	Scientific Explanation	Impact / Problem	Proposed Solution
1	Computational Complexity	Core operations rely on logarithmic and angular transformations.	Difficult to perform manually.	Develop an integrated computational tool (ICGNS Calculator).
2	Absence of Linear Ordering	The system redistributes values across circular layers (rings).	Difficulty in ordering numbers compared to the decimal system.	Construct a dedicated ordering function based on (r, θ).
3	Angular Repetition	The angular component repeats with each multiplication by the base (B).	Hard to distinguish numbers sharing the same angle.	Use the ring index (r) to separate hierarchical layers.
4	Lack of Direct Additivity	Addition is not closed within the circular geometric framework.	Requires returning to Cartesian representation.	Introduce approximate addition functions operating within the circular space.
5	Sensitivity to Small or Negative Values	Logarithmic functions are undefined for $(V \leq 0)$.	Creates a discontinuity (gap) around zero.	Apply a small numerical offset (ε-shift).
6	Multi-level Interpretation	The system combines logarithmic, angular, and radial components.	Difficult for non-specialists to grasp.	Develop a structured, three-level instructional guide.
7	Limited Published Applications	The system is entirely new.	Weak experimental evidence in the literature.	Publish a series of standardized examples and applications.
8	Lack of Current Software Support	Existing software platforms are based on linear number systems.	Direct computational modeling becomes difficult.	Create a dedicated Python library for ICGNS.
9	Absence of a “Canonical Equivalent Number” Standard	Numbers may have multiple geometric analogs (numerical counterparts).	Uncertainty in identifying the primary representation.	Adopt a canonical standard based on phase (θ) and ring index (r).
10	Separation from Euclidean Geometry	The system is circular rather than linear.	Difficult to integrate with classical Euclidean methods.	Build an intermediate geometric transformation layer.

Table 4: Limitations and Theoretical Constraints of ICGNS

6.1. From Imperfections to Structural Perfection in the ICGNS System

The apparent flaws in the ICGNS system do not represent true deficiencies, but rather reflect the depth of its underlying structure. From its conceptual inception, the system was not built on the principle of rigid mathematical perfection, but rather on the principle of dynamic numerical movement, which transforms numbers into living, evolving entities, not static symbols. From this perspective, what appears to be a "weakness" in calculation or a "complexity" in representation is a direct reflection of the cyclical, wave-like nature through which the system attempts to redefine the numerical concept itself.

Just as infinity initially represented a flaw in ancient mathematical systems before becoming a cornerstone of modern analysis, and just as the number π appeared to be an infinite value before becoming a symbol of cosmic consistency, so too can repetition, complexity, and nonlinearity in ICGNS be considered evidence of the system's dynamism and inherent numerical nature. It is a system that does not seek to replace integers, but rather to reveal their internal levels: logarithmic, radical, and temporal, demonstrating that every number is not a fixed point on an axis, but a position within a shifting numerical orbit.

Thus, these "Flaws" represent open areas of mathematical growth, driving the formulation of new computer systems, alternative numerical geometries, and philosophical conceptions that transcend the old dichotomy between quantity and constant. In other words, the system's imperfection is part of its perfection, because the deficiency here is not a break in the structure, but an opening toward a new mathematical dimension, where the challenge becomes a source of knowledge, and the deficiency a axis of development.

7. Advantages of the Intermediate Circular Geometric System of Numbers (ICGNS)

Although the ICGNS offers an unconventional view of number, it possesses a range of scientific and philosophical advantages that make it a valuable framework for future mathematical studies. It does not replace the decimal system or the familiar coordinate representation, but rather provides an alternative geometric approach to understanding the internal structure of numbers, revealing new properties invisible in the traditional number line.

The system is unique in that it relies on a circular space that represents numerical relationships through the loop (r) and the angle (θ) instead of the usual linear arrangement. This transformation provides a new way to measure numerical distances and to classify numbers according to symmetric logarithmic planes (*Table 5*).

Item	Advantage	Explanation
1	**Unified geometric representation**	The system represents natural, integer, rational, and negative numbers under a single radial framework.
2	**Logarithmic ring structure**	Numbers are organized into concentric rings whose radii grow multiplicatively.
3	**Revealing hidden numerical relationships**	Numbers that appear distant on the linear axis may have close angular positions in ICGNS.
4	**Geometric distance measurement**	Distance between numbers can be expressed via radial Euclidean metrics instead of linear subtraction.
5	**Alternative visual representation**	Provides a new conceptual tool for teaching, visualization, and numerical pattern discovery.
6	**Compatibility with Cartesian geometry**	Every number can be converted to a point (x, y), enabling use of analytic geometry tools.
7	**Useful for cyclic and periodic analysis**	Angular representation makes the system suitable for cycles, periodic functions, and signal modeling.
8	**Unique angular signature**	Each number has a distinct angle that may be used as a form of geometric identity.
9	**Potential for algorithmic innovation**	Opens possibilities for new algorithms in numerical analysis and data representation.

Table 5: Main Advantages of the ICGNS System

8. Conclusion

In conclusion, this study introduces a novel conceptual framework for re-representing numerical values through the Independent Circular Geometric Number System (ICGNS), offering an alternative perspective that transcends the structural limitations of the traditional linear number line. The findings demonstrate that mapping a number into a circular space—via its logarithmic magnitude, angular position, and ring index—reveals structural relationships and numerical symmetries that remain invisible under standard linear representation. This shift from linearity to circularity enables new modes of identifying numerical analogues, detecting patterns, and interpreting values across homogeneous logarithmic layers.

The results highlight the potential of ICGNS to serve as a complementary tool in theoretical mathematics, as well as in the modelling of cyclic, periodic, and wave-based phenomena across physics, astronomy, and geography. Although the proposed system is not intended to replace established numerical frameworks, it provides a distinct and promising geometric alternative that may inspire new analytical techniques, computational algorithms, and representational models.

Accordingly, this work represents a foundational step toward developing a broader mathematical structure, and an open invitation for researchers to refine, expand, and experimentally test the system. The author hopes that ICGNS will stimulate further exploration and contribute to a deeper understanding of numerical architecture and alternative modes of representation.

References

1. Overmann, K. A. (2018). Constructing a concept of number. *Journal of Numerical Cognition, 4*(2), 464-493.
2. “The original geometric interpretation of complex numbers is attributed to Euler (1748) and Gauss (1831), as discussed in Stillwell (2010) and Nahin (2018).”
3. Richter, W. D. (2021). Three-complex numbers and related algebraic structures. *Symmetry, 13*(2), 342.
4. Aldana, G. (2022). Maya calendar and Mesoamerican astronomy. *Encyclopedia of the History of Science, 4*(1).
5. King, D. A., Samsó, J., & Goldstein, B. R. (2001). Astronomical handbooks and tables from the Islamic World (750-1900): An interim report. *Suhayl. International Journal for the History of the Exact and Natural Sciences in Islamic Civilisation*, 9-105.
6. Huffman, C. A. (Ed.). (2014). *A history of Pythagoreanism*. Cambridge University Press.