DOI: 10.53469/jerp.2025.07(04).11

Celestial Mathematics: A Recursive Framework for the Unified Expansion of Scientific Equations

Natasha Dua

Abstract: ***Celestial Mathematics (CelMath) proposes a novel recursive expan- sion framework for physical and mathematical sciences. Unlike traditional mathematical structures, which treat numbers, space, and energy as static entities, CelMath introduces self-replicating, fractal recursion models that evolve dynamically. This paper formalizes CelMath equations, demon- strating how they generalize known mathematical physics while reducing to classical formulations when recursive effects vanish. Applications range from quantum mechanics, general relativity to artificial intelligence and computational learning. Finally, we outline potential experimental and computational tests to validate this approach.***

Keywords: Recursive mathematics, fractal spacetime, quantum mechanics, artificial intelligence, unified physics

1. Introduction

Mathematics has traditionally been developed in a linear and static fashion, with discrete structures governing number theory, continuous equations describing physics, and deterministic algorithms controlling artificial intelligence. However, emerging fields such as quantum computing, neural networks, and cosmology suggest that recursive, self-replicating, and fractal-based processes may provide a deeper understanding of reality.

1.1 Research Question

We explore whether a recursive, fractal-expanding framework of mathematical physics can:

- Extend general relativity to include self-replicating spacetime curvature.
- Modify quantum mechanics via recursive wavefunctions.
- Introduce fractal-based energy redistribution, potentially explaining dark matter/energy.
- Improve AI and computational learning models using self-expanding logic.

2. Mathematical Framework of Celestial Mathematics

2.1 Recursive Energy Dynamics

Traditional physics treats energy as a conserved quantity, evolving through fixed differential equations. CelMath extends this by incorporating fractal recursion in energy distributions:

$$E_{total} = \int_0^{\propto} (w(x) \cdot \log(x) + (1 - w(x)) \cdot (-\log(x)))\, dx \qquad (1)$$

where w(x) is a dynamic weight function that self-adapts based on recursive influences.

2.2 Fractal Spacetime Curvature

Unlike standard general relativity, which assumes smooth spacetime curvature, CelMath postulates that spacetime expands recursively in nested layers:

$$R_{\text{total}} = \sum_{n=0}^{\infty} \frac{R_n}{(1+n)^d} \qquad (2)$$

where d represents the fractal dimension of curvature replication.

2.3 Quantum Wavefunction Expansion

Quantum mechanics assumes wavefunctions collapse deterministically. CelMath suggests an infinite recursive quantum state evolution:

$$\Psi(x,t) = \Psi_0 \cdot e^{-i\omega t} + \sum_{n=1}^{\infty} \Psi_n(x) \cdot \sin(n\pi x) \qquad (3)$$

2.4 Unified Celestial Field Equation

CelMath extends Einsteins General Relativity by adding recursive gravity effects:

$$G_{\mu\nu} + \Lambda g_{\mu\nu} = \kappa T_{\mu\nu} + \sum_{n=1}^{\infty} \frac{\Phi_n}{n^d} \qquad (4)$$

If d=0, the equation reduces to classical relativity.

3. Conclusion

Celestial Mathematics presents a recursive, fractal-based expansion of existing mathematical structures. It generalizes classical physics, quantum mechanics, and AI models, maintaining validity in known cases while extending predictability into new areas. With further computational tests and experimental validation, CelMath could bridge the gap between quantum mechanics, relativity, and artificial intelligence.

References

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