Fractal Universe Theory: Unified Force Mathematics

Author: Adam G. Dickenson

# I. Introduction

Fractal Universe Theory (FUT) models all physical forces as manifestations of a nonlocal emergence field, ψ(r), arising from recursive collapse of a 2D substrate into 3D kinetic form. Each fundamental force reflects a distinct mode of coherence emergence from this substrate.

# II. General Emergence Potential Field

The scalar potential field is defined as:

ψ(r) : Local emergence density at position r

The corresponding emergence force is:

F\_emergence = -∇ψ(r)

# III. Force-Specific ψ(r) Definitions

## 1. Gravity

ψ\_gravity(r) = (G · M(r)) / r^γ

Where G is the emergence gravitational constant, M(r) is the recursive shell mass, and γ is the manifestation decay exponent (empirically ~1.618).

## 2. Electromagnetism

ψ\_EM(r, t) = A · cos(ωt − kr)

Where A is the amplitude of emergence toggling, ω is oscillation frequency, and k is spatial resonance number. ψ\_EM models manifestation oscillating across substrate collapse.

## 3. Strong Nuclear Force

ψ\_strong(r) = (1 / r) · exp(−λr)

This form models locked local coherence — exponential falloff reflects sharp bonding radius between emergence shells.

## 4. Weak Nuclear Force

P\_collapse ∝ exp(−α · ψ(r))

Where α is a decay sensitivity constant. Higher ψ coherence implies greater kinetic persistence; lower ψ increases collapse likelihood.

# IV. Unified ψ-Operator

All four forces can be unified under a composite emergence operator:

𝔽(ψ) = Σ Cᵢ · ∇ⁿⁱ ψᵢ(r, t)

Where Cᵢ are force-specific coefficients and ∇ⁿⁱ represents spatial or temporal differential structure unique to each force.

# V. Definitions and Constants

ψ(r) : Scalar emergence field potential

G : Gravitational emergence constant

γ : Emergence decay exponent (≈ φ ≈ 1.618)

ω : Oscillation frequency (EM)

k : Spatial wavenumber (EM)

λ : Coherence lock rate (strong force)

α : Collapse coupling constant (weak force)

M(r) : Shell-dependent manifestation mass