Entanglomorphic Entropy Framework: A Novel Approach to Randomness and Quantum-Inspired Metrics

Caleb C. — Red Team Research & Entropic Modeling, 2025

This paper introduces five novel equations designed to characterize entropy and quantum-coherent behavior in pseudorandom number generation environments. Each equation builds upon foundational quantum mechanical principles to explore coherence, chaos, and system memory in RNG outputs. The framework enables empirical stress testing and recursive modeling of entropy evolution in complex systems.

Ξ – Original Entanglomorphic Index

Equation: $\Xi = (\alpha^\beta + \beta^\alpha) \times [\sin(\pi C) + \cos(\pi S)]^2$

- Computes a baseline entanglement signal based on asymmetry between α and β.
- The amplification factor $\alpha^\beta + \beta^\alpha$ responds strongly to imbalance, giving greater weight to asymmetrically entangled states.
- The trigonometric term introduces wave-like modulation based on concurrence and entropy.
- Produces a resonant signal that reflects entanglement complexity and entropy magnitude.

Ψ – Chaos-Extended Entanglomorphic Index

Equation: $\Psi = \Xi \times \log_2(1 + \text{chaos\_factor})$

- Introduces a chaos-weighted modulation of Ξ.
- chaos_factor is derived from entropy in system-level timing and randomness.
- Adds logarithmic amplification or dampening to Ξ.
- Reveals system behavior under stochastic disturbance.

Ψ_1 – Fractal-Driven Entropy Bloom

Equation: $\Psi_1 = A \times [(\sin(\pi C) + \cos(\pi S)) / \sqrt{(|\alpha - \beta| + \varepsilon)}]$ ^ $[1 + (SC / (\log_2(1 + \text{chaos\_factor}) + \varepsilon))]$

- Produces nonlinear fractal-style growth from a core entropy signal.
- Sensitive to small changes in entanglement symmetry.
- Useful for simulating cascade effects and entropy tipping points.

Ψ_2 – Entropic Möbius Warp

Equation: $\Psi_2 = A \cdot [\sin(\pi \cdot (e^C / \pi^S)) \cdot \cos(\pi \cdot (S^2 / (1 + \text{chaos\_factor})))]^2 + \tan^2(C - S)$

This equation uses trigonometric and exponential modulation to simulate warped entanglement states. By distorting traditional Euclidean interpretation of randomness,
Ψ_2 mirrors properties observed in non-Euclidean geometries like Möbius strips and spinor fields in quantum mechanics.
- The `sin` and `cos` components simulate **entropic oscillations**.
- The `$\tan^2(C - S)$` component measures **resonant divergence**, which can signal non-linear collapse or chaotic bifurcations.
- Ideal for **benchmarking randomness decay under topological transformation** and resonance tension.

Ψ_3 – Recursive Entanglomorphic Lens

Equation: $\Psi_3 = A \cdot [\ \log_2(1 + \Psi\_\text{prev} \cdot \sin(\pi \cdot C)) + \cos(\pi \cdot S)^{(1 + (\Psi\_\text{prev} \bmod 3))}\ ]$

Ψ_3 introduces memory into entropy modeling, functioning similarly to a quantum walk. Prior ψ values influence future ones via a nonlinear recursive kernel.
- The `$\log_2(1 + \Psi\_\text{prev} \cdot \sin(\pi \cdot C))$` acts as a **memory accumulator**.
- The exponent `$(\Psi\_\text{prev} \bmod 3)$` simulates state-based **feedback cycling** across generations.
- Captures **temporal interference**, useful for systems with **history-dependent noise** (e.g., bounded randomness with hysteresis).

This equation helps model entropy behavior in systems not governed by purely Markovian properties and offers insight into **entangled time-evolution**.