Mathematical Notation

Primary Variables

K Performance statistic (dimensionless ratio $\Lambda_{\text{eff}}/W_{\text{actual}}$)

W Configured rolling window size (bytes)

$W_{\textbf{actual}}$ Actual effective window size achieved by system (bytes)

$\Lambda_{\textbf{eff}}$ Intrinsic characteristic wavelength (256 bytes)

H_e Execution heat of element e (heat units)

$H_{\textbf{total}}$ Sum of all execution heat values

P Performance metric (ns/word or cycles/instruction)

S Entropy of heat distribution (Shannon entropy, dimensionless)

σ^2 Variance of timing measurements

t Time variable (seconds or heartbeat ticks)

Fundamental Constants

λ_0 Intrinsic wavelength = 256 bytes (fundamental length scale)

f_0 Natural frequency = 2/3 cycles/window (standing wave frequency)

φ Golden ratio = $1.618\ldots$ (performance penalty ratio)

κ_0 Window capacity constant (analogous to permeability μ_0)

k_B Computational Boltzmann constant (heat-units/temperature)

$\hbar_{\textbf{comp}}$ Computational "Planck constant" ≈ 0.05

Derived Parameters

$A(W)$ Amplitude envelope of standing wave modulation

$A_{\max}$ Maximum amplitude ≈ 0.3 (dimensionless)

$W_{\textbf{decay}}$ Amplitude decay length scale ≈ 50000 bytes

ϕ Phase offset (radians)

α Latency sensitivity parameter (1/heat-units)

n Integer quantization number: $W = n \times 256$ bytes

Runtime State Vector

$$\mathbf{\Psi}(W,t) = \begin{pmatrix} K(W,t) \\ H_{\text{total}}(W,t) \\ P(W,t) \\ S(W,t) \\ \sigma^2(W,t) \end{pmatrix}$$

Operators

∇_W Configuration-space gradient (derivative with respect to window size)

$\partial/\partial t$ Partial time derivative

$\nabla_W \times$ Configuration-space curl

$\nabla_W \cdot$ Configuration-space divergence

∇_W^2 Configuration-space Laplacian

$\langle \cdot \rangle_t$ Time average

Quantum-Analog Notation

$|\psi\rangle$ State vector (Dirac notation)

$|\textbf{locked}\rangle$ Locked attractor eigenstate ($K \approx \Lambda_{\text{eff}}/W$)

$|\textbf{escaped}\rangle$ Escaped attractor eigenstate ($K \to 1.0$)

$|\alpha|^2, |\beta|^2$ Occupation probabilities

$\Delta E_{\textbf{eff}}$ Effective energy barrier (K-statistic units)

$P_{\textbf{tunnel}}$ Tunneling probability

Validation Metrics

CV Coefficient of variation: CV $= \sigma/\mu$

MAD Mean absolute deviation

R^2 Coefficient of determination (goodness of fit)

χ^2 Chi-squared statistic

Subscript/Superscript Conventions

- Subscript $_{\text{eff}}$ indicates effective or measured quantity
- Subscript $_{\text{baseline}}$ indicates baseline/unmodulated value
- Subscript $_{\text{wave}}$ indicates wave-induced correction
- Subscript $_{\text{comp}}$ indicates computational analog of physical constant

- Subscript $_0$ indicates fundamental/natural scale
- Subscript $_{i,j}$ indicates matrix indices (rows, columns)