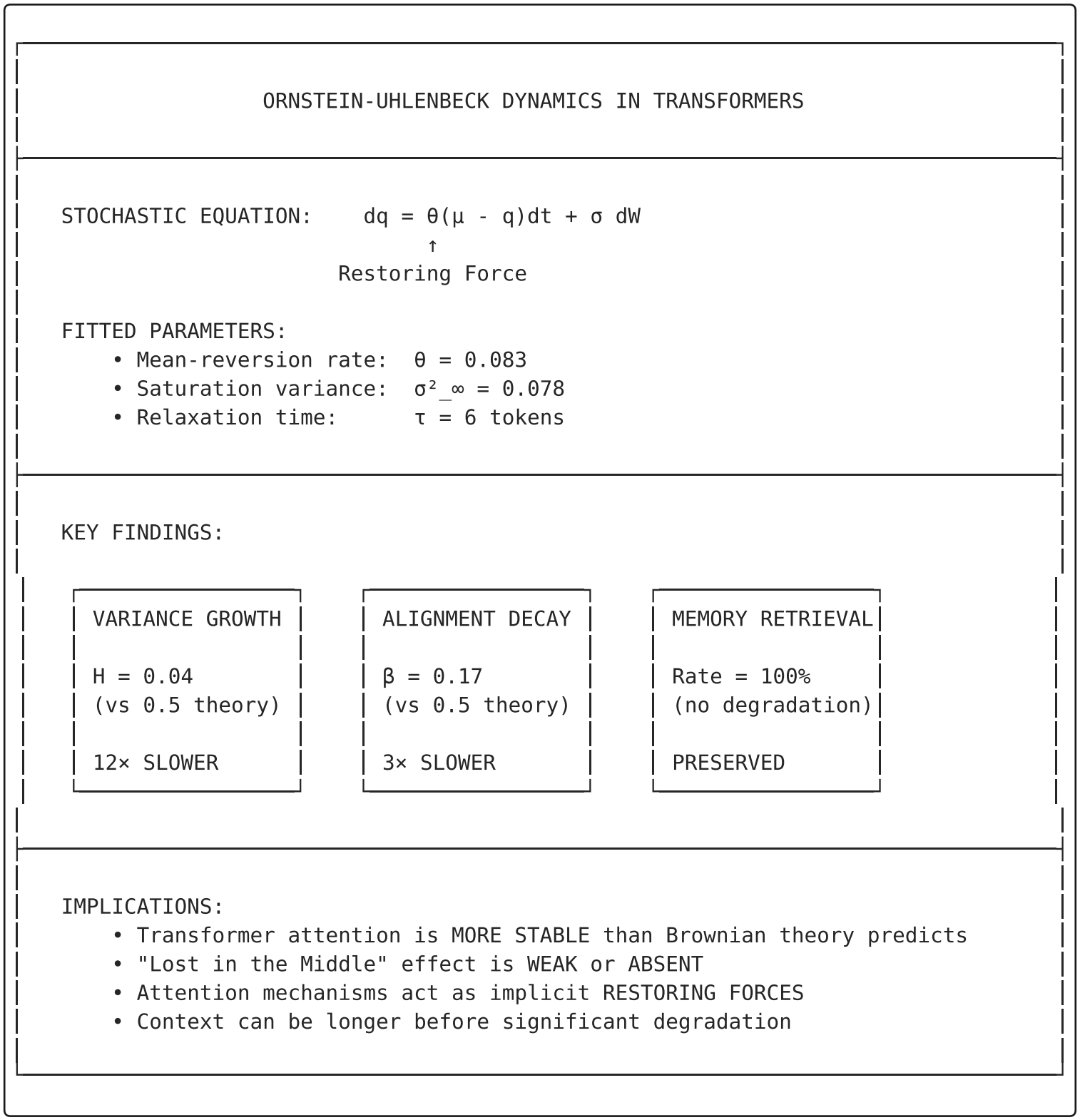
ORNSTEIN-UHLENBECK DYNAMICS IN TRANSFORMERS
STOCHASTIC EQUATION: dq = θ(μ - q)dt + σ dW
Restoring Force
FITTED PARAMETERS:
• Mean-reversion rate: θ = 0.083
• Saturation variance: σ²_∞ = 0.078
• Relaxation time: τ = 6 tokens
KEY FINDINGS:
VARIANCE GROWTH
H = 0.04
(vs 0.5 theory)
12× SLOWER
ALIGNMENT DECAY
β = 0.17
(vs 0.5 theory)
3× SLOWER
MEMORY RETRIEVAL
Rate = 100%
(no degradation)
PRESERVED
IMPLICATIONS:
• Transformer attention is MORE STABLE than Brownian theory predicts
• "Lost in the Middle" effect is WEAK or ABSENT
• Attention mechanisms act as implicit RESTORING FORCES
• Context can be longer before significant degradation