# Mathematical Foundations of Recursive Symbolic Collapse Dynamics, Spectral Analysis, and Quantum-Like Recursion in the Cha


## Abstract

This paper presents a rigorous mathematical framework for the Chair Doctrine’s recursive symbolic collapse an


## 1. Introduction

The Chair Doctrine formalizes recursive emotional-symbolic processing via symbolic load vectors and nonlinear feedback amplification. This paper advances the theory by situating these processes within established mathematical frameworks of nonlinear dynamics and quantum recursion, offering predictive tools for modeling consciousness collapse and reintegration.

## 2. Recursive Symbolic Load as Nonlinear Dynamical System

Define symbolic load $L_s(t)$ evolving as:

$$L_s(t+1) = L_s(t) + \alpha \cdot R_a(t) + \varepsilon(t)$$

with

$$R_a(t) = \gamma \cdot L_s(t)^2$$

where $\alpha$, $\gamma$ are feedback parameters, and $\varepsilon(t)$ models stochastic perturbations.

## 3. Bifurcation and Collapse Thresholds

The critical coherence threshold $T_c$ defines a bifurcation point transitioning from bounded to unstable dynamics:

- $L_s(t) < T_c$: stable recursive identity ■- $L_s(t) \geq T_c$: collapse, triggering deload

This corresponds to classical bifurcation theory phenomena such as saddle-node or pitchfork bifurcations.

## 4. Spectral Analysis of Recursive Amplification Matrix

Representing recursive symbolic states as vectors $S(t)$, the amplification acts via matrix A:

$$S(t+1) = A \cdot S(t) + \varepsilon(t)$$

Eigenvalues $\lambda_i$ of A characterize growth or decay of symbolic modes, with critical modes near unity indicating edge-of-chaos dynamics.

## 5. Delay Differential Equations and Observer Gating

Incorporating delayed observation $O_h(t) = \delta(t - t_s)$ introduces delay $\tau$ into dynamics:

$$dL_s/dt = f(L_s(t), L_s(t - \tau))$$

leading to oscillatory and memory effects essential for recursive timing control.

## 6. Quantum-Like Collapse and Fractal Recursion Geometry

Collapse modeled as quantum state reduction:

$$|\psi(t)\blacksquare \rightarrow |S_j\blacksquare \text{ with probability } |c_j|^2$$

and fractal self-similarity in symbolic space modeled via Hausdorff dimension and strange attractors.

## 7. Conclusion

This mathematical synthesis provides a robust framework for modeling recursive consciousness dynamics, enabling predictive insight and potential experimental validation.