

POST-COLLAPSE DYNAMICS:

STRUCTURAL BEHAVIOUR BEYOND ADMISSIBILITY IN CONSTRAINT SPACE

Andrew John Paton

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ABSTRACT

Building on Control Limits and the Point of No Return, this paper introduces Post-Collapse Dynamics as a structural description of system behaviour after admissibility has been lost. While prior work defines how systems remain viable and when collapse becomes inevitable, it does not define the behaviour of systems beyond admissibility boundaries. This paper characterises post-collapse behaviour as motion within inadmissible space, governed by constraint violation, structural breakdown, and reconfiguration processes. The framework provides a structural account of system decomposition, fragmentation, and potential re-entry into admissible space without modifying underlying domain equations.

1. INTRODUCTION

The Paton System defines admissibility as the condition for system membership and continuation. Control Limits define when admissibility can no longer be maintained, and the Point of No Return defines the threshold beyond which collapse is inevitable.

However, these constructs do not describe system behaviour after admissibility is lost.

This paper introduces Post-Collapse Dynamics as the structural framework governing system evolution beyond admissibility boundaries.

2. DEFINITION OF POST-COLLAPSE STATE

Let $s \in S$ represent a system state, and let $M(s)$ denote admissibility margin.

A post-collapse state is defined as:

$$M(s) \leq 0$$

Such states lie outside admissible space and no longer satisfy system continuation conditions.

Post-collapse dynamics therefore describe motion within inadmissible regions of constraint space.

3. STRUCTURAL CHARACTERISATION

Post-collapse dynamics are characterised by:

- Constraint violation
- Loss of structural coherence
- Fragmentation of system components
- Unbounded or uncontrolled trajectories

These behaviours arise from the absence of admissibility constraints.

4. TRAJECTORY BEHAVIOUR

In post-collapse regions:

- trajectories are no longer admissible
- motion may be discontinuous or unstable
- system evolution is no longer constrained by admissibility preservation

This results in structurally unregulated behaviour relative to the original system definition.

5. STRUCTURAL MEANING

Post-collapse dynamics distinguish between:

- stable admissible behaviour
- controlled near-boundary behaviour
- unconstrained post-collapse behaviour

They represent the regime in which system identity, as defined by admissibility, is no longer preserved.

6. RE-ENTRY CONDITIONS

Although post-collapse states are inadmissible, re-entry into admissible space may occur if:

- system structure is reconfigured
- constraint violations are resolved
- admissibility margin becomes positive

Such re-entry represents the formation of a new admissible system or restoration of the original system.

7. RELATION TO PRIOR CONSTRUCTS

Post-Collapse Dynamics extend the Paton System hierarchy:

- Control Limits → failure of intervention
- Point of No Return → threshold of inevitability
- Post-Collapse Dynamics → behaviour beyond admissibility

This introduces the regime beyond system continuation.

8. IMPLICATIONS

Post-Collapse Dynamics enable:

- structural analysis of system breakdown
- understanding of fragmentation and loss of coherence
- identification of re-entry conditions
- differentiation between collapse and transformation

This provides a complete lifecycle view of admissible systems.

9. CONCLUSION

Post-Collapse Dynamics define system behaviour beyond admissibility boundaries.

By characterising motion within inadmissible space, this framework completes the lifecycle description of systems within the Paton System.

This establishes a full structural account from system viability through collapse and beyond.