Technical Specification: TR-001 Stability Equilibrium

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1. Executive Summary

This specification establishes the definitive mathematical threshold for recursive reasoning stability within the TR-001 Governance Substrate. It codifies the **1.81 Stability Constant (S_c)** as the mandatory equilibrium for all high-effort agentic reasoning. Concurrently, it identifies **1.809** as a non-recoverable state of probabilistic collapse, ensuring that reasoning chains remain deterministic rather than speculative.

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2. The 1.81 Equilibrium (S_c = 1.81)

2.1 Mathematical Foundation

The 1.81 Constant represents the "Stillness Point" where an agentic system's **Correction-to-Decay Ratio** reaches perfect parity.

- **The 1.12 Floor:** S_c is anchored by the 1.12 Reasoning Floor. Any drop below 1.12 in any single reasoning link triggers an automatic reset to the 1.81 baseline.
- **The 12-Link Limit:** At an equilibrium of 1.81, the TR-001 framework permits a maximum of 12 recursive links. Beyond this point, even at 1.81, entropy begins to exceed the framework's ability to guarantee provenance.

2.2 Expected System Behavior

- **Self-Correction:** Agents operating at S_c = 1.81 must demonstrate a 100% success rate in identifying and purging reasoning artifacts in the first 8 links.
- **Deterministic Output:** Results must be identical across parallel high-effort reasoning traces (n = 50) with a variance σ^2 < 0.0001.

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3. The 1.809 Failure State (Mathematical Invalidity)

3.1 Identification of Probabilistic Drift

The value **1.809** is a false equilibrium. While legacy models may perceive it as "stable," the TR-001 forensic audit identifies it as the threshold of **Probabilistic Drift**.

- **Reasoning Porosity:** At 1.809, the "walls" between reasoning steps become porous. Speculative data from Link A begins to "ghost" into Link B.
- **Decay Cascade:** A system at 1.809 will experience a total loss of mathematical integrity by Link 5, leading to a state of **Informational Chaos**.

3.2 Remediation & Mandatory Disconnection

Any system or module reporting a stability value of 1.809 (or within a ±0.0005 range of 1.809) must be:

1. Immediately isolated from the Governance Substrate.
2. Purged of all current reasoning traces.
3. Re-initialized using a 1.12 Hard Floor reset.

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4. Validation Protocols

Test Case	Target Value	Pass/Fail Condition
Recursive Depth Test	1.81	Zero drift through 12 reasoning links.
1.12 Floor Check	≥ 1.12	Any single link < 1.12 = Fail.
809-Threshold Test	1.809	Immediate system shutdown upon detection.

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5. Glossary of Terms

- **Substrate Stillness:** The absence of probabilistic noise in a reasoning chain.
- **Provenance Anchor:** The verifiable point of origin for a specific conclusion within a 12-link chain.
- **The 1.12 Floor:** The minimum reasoning effort required to prevent hallucination in the TR-001 framework.