Length–Mass Reduction (LMR) Theory
Paper II: Lattice, Perturbation, and Persistence

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Abstract

This paper examines what becomes structurally unavoidable once a lattice is admitted as a foundational structure within the Length–Mass Reduction (LMR) framework. The analysis distinguishes transient perturbations from persistent configurations without invoking forces, energy, particles, or dynamical laws. Persistence is defined negatively, as the prevention of full redistribution under continued lattice activity. The results establish necessary conditions for endurance within the lattice and prepare the ground for explicit structural realizations developed in subsequent papers. No physical interpretation or dynamical model is introduced.

Preface and Scope

This paper proceeds from a minimal axiomatic admission of structure and develops its consequences through definitions and propositions. It does not assume known physical mechanisms, empirical laws, or interpretive models. Instead, it asks what must follow once a lattice is admitted as a foundational structure and perturbations are allowed to occur within it.

This work adopts the codex-level discipline introduced in Paper I, restricting itself to axiomatic and structural statements only. Any later correspondence with familiar physical phenomena is deferred and does not modify the results established here.

Part I

Lattice-Theoretic Foundations

I.1 Admission of the Lattice

Orientation. We begin by admitting a lattice as a primitive structure. This admission is not a physical claim but a formal one: the lattice is taken as the relational substrate upon which all subsequent distinctions are defined.

Axiom 1 (Lattice). A lattice is a connected relational structure whose elements admit adjacency and scale.

Axiom 2 (Free Lattice Unit). A free lattice unit is a homogeneous reference configuration of the lattice in which no relational distinctions are present.

The free lattice unit is not a background through which other structures move. It is the baseline against which all structural distinctions are measured.

I.2 Perturbation

Orientation. Perturbation is introduced without implying motion, force, or propagation. A perturbation alters the lattice by changing relational scale locally.

Definition 2.1 (Perturbation). A perturbation is a local alteration of lattice scale relative to the free lattice unit.

A perturbation does not occur *within* a fixed lattice; it is a modification of the lattice itself.

Proposition 2.1. All perturbations induce compression relative to the free lattice unit.

Compression is understood here as a relational distinction from the free lattice unit, not as a physical force or volumetric process.

Rarefaction is understood only as the inverse relational description of compression. Its explicit treatment becomes relevant when phase or relativistic structure is introduced and is therefore deferred.

I.3 Redistribution and Transience

Orientation. Not all perturbations persist. Most resolve by redistribution, leaving no enduring structure.

Definition 3.1 (Redistribution). Redistribution is the re-expression of a perturbation across the lattice such that no local scale distinction remains.

Proposition 3.1. Perturbations that admit full redistribution are transient.

Proposition 3.2. Transience does not imply the absence of perturbation, only the absence of sustained constraint.

I.4 Persistence

Orientation. Persistence is not defined by accumulation or addition. It is defined by the prevention of full redistribution.

Definition 4.1 (Persistence). A configuration is persistent if it prevents complete redistribution under continued lattice activity.

Proposition 4.1. Persistence requires constraint.

Proposition 4.2. Constraint is structural and does not imply force, pressure, or energy.

I.5 Minimality

Orientation. If persistence is not generic, then minimal conditions for persistence must exist.

Definition 5.1 (Minimal Persistent Configuration). A minimal persistent configuration is one that satisfies the conditions for persistence without containing reducible substructure.

Proposition 5.1. Minimality refers to conditions, not forms.

Proposition 5.2. Any configuration failing to meet minimal conditions cannot persist independently.

I.6 Relational Bias

Orientation. Persistence alone does not determine relational behavior. The symmetry or asymmetry of a persistent configuration determines its relational consequences.

Definition 6.1 (Symmetry). A persistent configuration is symmetric if its constraints admit no relational distinction across the lattice.

Definition 6.2 (Asymmetry). A persistent configuration is asymmetric if its constraints introduce a relational distinction.

Proposition 6.1. Symmetric persistent configurations admit no relational bias.

Proposition 6.2. Asymmetric persistent configurations introduce relational bias without invoking direction or motion.

Proposition 6.3. Minimal asymmetric persistent configurations admit mobility relative to the lattice.

This mobility is not dynamical behavior but structural permission arising from asymmetry.

I.7 What Has Not Been Used

No assumptions have been made regarding:

- particles or fields,
- forces or energy,
- time evolution or equations of motion,
- charge, mass, or empirical constants,
- relaxation principles or equilibrium states.

The results follow solely from the admitted lattice structure and the distinction between redistribution and constraint.

I.8 Outlook

This paper has established the structural conditions under which persistence becomes possible within a lattice framework. It has shown that persistence requires constraint, that minimality is unavoidable, and that asymmetry introduces relational bias.

In Paper III, explicit structural realizations satisfying these conditions will be examined. Subsequent papers will address how boundary conditions and coupling extend these results into recognizable physical regimes.

Part II

Structural Primitives

II.A Half-Folds and Complementarity

A half-fold is a primitive structural element of the lattice. It represents an incomplete unit of propagation or closure.

A half-fold is not self-resolving. By construction, it demands resolution.

II.A.1 Complementarity

Half-folds admit complementary pairing. Complementarity is achieved when a second half-fold supplies resolution along the demanded direction, not by opposition but by continuation.

Complementarity is structural and does not imply force, interaction, or symmetry.

II.A.2 Closed Configurations

A closed configuration is a pairing of complementary half-folds that admits internal resolution. Such configurations do not require continued lattice constraint to maintain structural closure.

Closed configurations do not induce persistent constraint.

II.A.3 Open Configurations

An open configuration is one in which at least one half-fold remains unresolved. Open configurations require continued lattice engagement.

Persistence of an open configuration does not imply accumulation or substance; it indicates prevention of full resolution.

II.B Modes of Resolution

II.B.1 Paired Closure

Two complementary half-folds resolve into a closed configuration without residual constraint.

II.B.2 Environmental Resolution

A half-fold may resolve through interaction with surrounding lattice structure. Such resolution is non-persistent.

II.B.3 Persistent Unresolved Resolution

A half-fold may remain unresolved while being continuously sustained by lattice engagement. Persistence is defined negatively: it is the prevention of full resolution.

II.B.4 Non-Uniqueness of Resolution

The lattice does not privilege any resolution mode. Admissibility is determined solely by structural consistency.

II.C Propagation Without Persistence

II.C.1 Propagation Without Endurance

Resolved configurations may propagate through the lattice without inducing persistent constraint.

II.C.2 Geodesic Admissibility

Propagation follows admissible relational paths without invoking force or direction.

II.C.3 Motion and Endurance

Motion does not imply persistence. Persistence does not imply motion.

II.C.4 Structural Neutrality of Propagation

Propagation alone does not compress or sustain lattice deformation.

References

[1] J. Rollins, *Length–Mass Reduction (LMR) Theory, Paper I: Codex and Foundational Grammar*, Zenodo (2025).

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