Structural Regime Resolution in the Allen Orbital Lattice

PAL, Coheron Spacing, and Transition Thickness

Structural Regime Resolution Series — Paper VI

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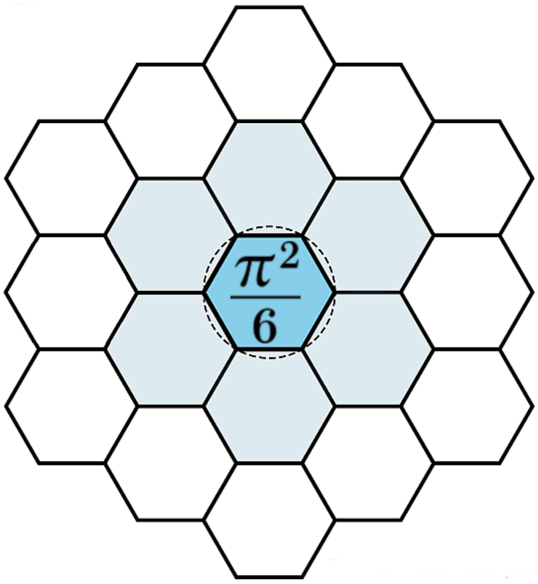

Abstract

This paper couples Structural Regime Resolution (SRR) to the microphysical structure of Pattern Field Theory (PFT): the Allen Orbital Lattice (AOL), Phase Alignment Lock (PAL), and coheron organization. While SRR is a description-control parameter, physical systems exhibit structural properties that control whether constraint mismatch resolves through volumetric excitation or sharp reconfiguration. We introduce SRR proxies in PFT terms: coheron spacing, PAL lock capacity, constraint mismatch intensity, and transition thickness. These quantities explain why some dominion boundaries become thick, heated, and layered, while others collapse into thin skins or sharp crossings. The framework provides the first structural bridge between SRR and the generative substrate of PFT.

Coupling SRR to the Allen Orbital Lattice

Purpose

Papers I–V established SRR as a universal description-control parameter. This paper addresses a deeper question:

What structural properties of a system determine whether a transition zone becomes thick and heated, or thin and sharp?

In PFT, the answer must be expressed in terms of:

- the Allen Orbital Lattice (AOL),
- coheron packing and admissibility,
- Phase Alignment Lock (PAL) capacity,
- and constraint mismatch intensity.

Unoccupied Coordinates as Capacity

In PFT, unoccupied AOL coordinates are not empty space. They represent:

- admissible but currently unused pattern capacity,
- deformation room for constraint accommodation,
- buffering volume for mismatch resolution.

When such capacity is abundant, transitions can thicken. When it is scarce, transitions harden into sharp reconfiguration layers.

Coheron Spacing and Packing Stress

Definition 1 (Coheron spacing)**.** *Coheron spacing is the effective separation between admissible coheron occupancy patterns on the AOL.*

- Dense packing → little deformation room → thin, sharp transitions.
- Sparse packing → large deformation room → thick, volumetric transitions.

Phase Alignment Lock (PAL) Capacity

PAL enforces coherence across regions. It has finite capacity.

- If PAL can span a mismatch gradient, the transition remains thin.
- If PAL cannot maintain coherence across the gradient, the region decoheres and thickens into a volumetric excitation zone.

Constraint Mismatch Intensity

Definition 2 (Mismatch intensity M)**.** *Mismatch intensity is a structural measure of how incompatible two ordering regimes are in AOL terms.*

Examples:

- Topological mismatch (field connectivity, ordering graphs)
- Occupancy mismatch (density, packing, admissibility)
- Phase or transport mismatch

High M drives thick, heated zones unless PAL capacity is exceptionally strong.

Transition Thickness δ as a PFT Outcome

We now treat δ not as arbitrary, but as emergent from structure.

Proposition 1 (Determinants of transition thickness)**.** *The thickness δ of a constraint transition zone increases when:*

- *coheron packing is dense and deformation capacity is low,*
- *unoccupied coordinate capacity is insufficient to buffer mismatch,*
- *PAL cannot span the mismatch gradient,*
- *mismatch intensity M is high.*

Conversely, strong PAL and low M collapse δ into a thin skin.

Heating as Structural Necessity

When mismatch cannot be resolved by reconfiguration, it must be dissipated.

Remark 1 (Heat as failed reconfiguration)**.** *In PFT, heating and energetic particle populations are the necessary excitation channels of unresolved constraint mismatch.*

This explains:

- heliopause heating,
- reconnection exhaust heating,
- shock heating,
- critical fluctuation heating,
- discharge channel heating.

Nested Layers and "Thin Skin in Thick Zone"

Many systems show:

- a broad heated transition region,
- plus one or more thin reconfiguration sublayers.

In PFT this occurs when:

- most mismatch must be dissipated volumetrically,
- but a subset of constraints can still be sharply reconfigured.

This produces the heliopause hierarchy and many shock/reconnection structures.

SRR as Description vs Structure

Important distinction:

- SRR is a description-control parameter.
- AOL, PAL, coheron spacing, and mismatch intensity determine what SRR *will reveal.*

SRR does not create thickness. Structure does. SRR only decides whether you see it.

Canonical Statement

Remark 2 (AOL–SRR coupling statement)**.** *In Pattern Field Theory, the thickness, heating, and layering of transition zones are determined by coheron packing, unoccupied coordinate capacity, PAL span, and mismatch intensity. Structural Regime Resolution controls whether these realities appear as volumetric regions or collapse into effective boundaries.*

Consequences

- "Barriers" are hardened mismatch zones, not objects.
- Heat is structural necessity, not incidental.
- Thin boundaries signal successful PAL spanning, not ontological surfaces.
- Thick boundaries signal structural overload of coherence capacity.

Conclusion

This paper completes the SRR series by binding the description-control concept to the generative substrate of PFT. It explains why some boundaries thicken, heat, and layer, while others remain thin. Together with Papers I–V, SRR is now both a universal diagnostic framework and a structurally grounded consequence of the Allen Orbital Lattice, coheron organization, and Phase Alignment Lock.

Glossary

Allen Orbital Lattice (AOL) Discrete generative substrate of Pattern Field Theory.

Coheron Fundamental excitation and ordering carrier in PFT.

PAL Phase Alignment Lock, coherence stabilization mechanism.

Structural Regime Resolution (SRR) Description-control parameter deciding volumetric vs boundary representation.

Mismatch intensity M Measure of incompatibility between constraint regimes.

δ Physical thickness of a constraint transition zone.

Document Timestamp and Provenance

This document is part of Pattern Field Theory (PFT) and the Allen Orbital Lattice (AOL). It couples Structural Regime Resolution (SRR) to the underlying structure of PFT, serving as Paper VI in the Structural Regime Resolution Series.