The Simulonic Warp Field: Unified Matrix Formulation for Sectional Asymmetry

Simulonic Research Collective

Proxima b Mission Design Series
December 26, 2025

Abstract

This document presents the unified matrix formulation of the simulonic scalar field $S(x^\mu)$ that generates the sectional warp bubble depicted in the Proxima b mission schematics. The formulation captures the essential distinction between warp sections (positive kinetic sign, stabilizing expansion) and warp antisections (phantom kinetic sign, exotic contraction) via a diagonal sign matrix $\hat{\epsilon}$. The system is driven by the 12 toroidal simulonic field generators and supports the observed multi-zone asymmetry required for stable superluminal-effective travel.

Section 1: THE SIMULONIC FIELD EQUATION

The simulonic scalar field S obeys a piecewise field equation distinguished by the sectional sign function $\epsilon(\mathbf{r})$:

$$\epsilon(\mathbf{r}) = \begin{cases} +1 & \text{in warp sections (I, II)} \\ -1 & \text{in warp antisections (i, ii, iii, iv)} \end{cases}$$

To unify the family of zone-specific equations, we discretize into the six labelled zones and introduce the zone amplitude vector

$$\vec{S} = \begin{pmatrix} S_{\mathrm{I}} \\ S_{\mathrm{II}} \\ S_i \\ S_{ii} \\ S_{iii} \\ S_{iv} \end{pmatrix}, \qquad \vec{J} = \begin{pmatrix} J_{\mathrm{I}} \\ J_{\mathrm{II}} \\ J_i \\ J_{ii} \\ J_{iii} \\ J_{iv} \end{pmatrix}, \qquad \frac{d\vec{V}}{dS} = \begin{pmatrix} \dfrac{dV}{dS_{\mathrm{I}}} \\ \dfrac{dV}{dS_{\mathrm{II}}} \\ \dfrac{dV}{dS_i} \\ \dfrac{dV}{dS_{ii}} \\ \dfrac{dV}{dS_{iii}} \\ \dfrac{dV}{dS_{iv}} \end{pmatrix}.$$

The **unified field equation** is then

$$\hat{\epsilon}\,\Box\vec{S} + \frac{d\vec{V}}{dS} = \vec{J},$$

where $\Box$ acts componentwise in the bubble comoving frame, $V(S)$ is the simulonic potential (typically quartic), and $\vec{J}$ encodes the symmetric driving by the 12 toroidal generators.

Section 2: THE SECTIONAL SIGN MATRIX

The core innovation is the diagonal sign matrix

$$\hat{\epsilon} = \begin{pmatrix} +1 & 0 & 0 & 0 & 0 & 0 \\ 0 & +1 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 \end{pmatrix}.$$

This matrix enforces normal scalar kinetics in the two warp sections (rows 1–2) and phantom kinetics in the four warp antisections (rows 3–6), directly producing the required negative energy density for frontal contraction while maintaining positive-energy stabilization aft.

Section 3: STRESS-ENERGY AND BOUNDARY CONDITIONS

The simulonic contribution to the Einstein equations is

$$T^S_{\mu\nu} = \sum_k \theta_k(\mathbf{r}) \left[\epsilon_k \, \partial_\mu S \, \partial_\nu S - g_{\mu\nu} \left(\frac{1}{2} \epsilon_k \, \partial^\lambda S \, \partial_\lambda S - V(S) \right) \right],$$

where $\theta_k(\mathbf{r})$ are zone indicator functions.

At section–antisection interfaces, continuity requires:

- S continuous,
- $\hat{\epsilon}\,\vec{n} \cdot \nabla \vec{S}$ continuous (weighted normal derivative).

These conditions ensure smooth metric matching across the labelled boundaries while preserving sharp energy-sign transitions.

Section 4: CONCLUSION

The unified matrix form compactly encodes the multi-zone simulonic dynamics observed in the schematics, providing a tractable framework for numerical bubble shaping, generator phasing, and inertial-null-core stabilization en route to Proxima b.