Section T-7 — Wave-Curvature Field Equations

A closed PDE system unifying stability, stress, curvature, and entanglement

T-1 defined the manifold, metric, and indexing required for tensor calculus in C-4.

T-2 defined the Stability Tensor T^IJ as the eigen-curvature object controlling collapse, tunneling, and soft-mode activation.

T-3 provided the transport and evolution law that makes tensor stability flow covariantly on the CUWF manifold.

T-4 refined collapse into wave-stress propagation through the Entropic Stress Tensor S^I_j.

T-5 introduced Ξ^IJ as the tensor of entanglement, generated from stability curvature and transport-induced coherence.

T-6 introduced entropic curvature R as the geometric response of the manifold to stability softening and entanglement growth.

T-7 now assembles these objects into one dynamical PDE system. This is the point where the tensor pieces of C-4 stop being separate definitions and become a closed field engine.

In structural terms, T-7 is the CUWF analogue of:

(Einstein Geometry + Matter Field Equation + Entanglement Feedback).

However, the CUWF system does not require probability, Hilbert-space collapse, or a measurement postulate. It requires only curvature evolution, tensor stress, and entanglement feedback on the entropic manifold.

T-7.1 Entropic Einstein-CUWF Field Equation

We introduce the entropic Einstein tensor as the curvature object that compresses Ricci-like curvature and scalar entropic curvature into a field-balance form:

$$G^I_j \equiv R^I_j - (1/2)\, g^I_j\, R$$

The CUWF field relation is then imposed as:

$$G^I_j = \kappa\, S^I_j + \lambda\, \Xi^I_j \qquad (23)$$

Term	Role
S^I_j	Entropic stress; collapse curvature expressed as anisotropic stress on the manifold.
Ξ^{IJ}	Entanglement source term; cross-sector or multi-node coherence that contributes to curvature.
κ, λ	Coupling parameters governing the strength of stress-curvature and entanglement-curvature feedback.

Interpretation:

If $\Xi = 0$, the system reduces toward classical collapse geometry.

If $\Xi \neq 0$, entanglement contributes to curvature and tunneling can begin.

Quantum geometry is therefore not randomness. It is nonzero entanglement curvature feeding back into the manifold.

T-7.2 Field Equation for Entropic Potential E

Recall the definition of the Stability Tensor:

$$T^{IJ} = \nabla^I \nabla^J E + \Phi^{IJ}$$

Define the entropic d'Alembertian as the metric contraction of the second covariant derivative of E:

$$\mathrm{Box}_E\, E \equiv g^{IJ} \nabla^I \nabla^J E$$

The field equation for the entropic potential is then written as:

$$\mathrm{Box}_E\, E = F(E, T, \Xi) \qquad (24)$$

A CUWF-natural coupling may be represented by:

$$F(E, T, \Xi) = \alpha\, g^{IJ} T^{IJ} + \beta\, g^{IJ} \Xi^{IJ} + \gamma\, \Phi_{tr}(E) \qquad (25)$$

This equation turns collapse into a wave-reaction system. The potential E does not merely sit beneath the tensor structure; it evolves in response to stability curvature, entanglement coherence, and non-normal activation. Measurement is not an external cause. The field itself reacts and reconfigures.

T-7.3 Coupled Wave-Curvature Field System (Final Form)

Combining the geometric field relation with the entropic potential equation gives the closed CUWF field engine:

$$\text{(Geometry)} \quad R^I{}_j - (1/2)\, g^I{}_j R = \kappa\, S^I{}_j + \lambda\, \Xi^I{}_j$$

$$\text{(Field)} \quad \mathrm{Box}_E\, E = F(E, T(E), \Xi(T))$$

with:

$$T^{IJ} = \nabla^I \nabla^J E + \Phi^{IJ}$$

$$\Xi^{IJ} = g^{KL} T^{IK} T^{JL}$$

This is the full CUWF field engine for C-4. The system closes because E generates T, T generates Ξ, Ξ contributes to curvature, and curvature feeds back into the field geometry. Collapse, tunneling, GHZ-type synchronization, and curvature feedback are therefore not separate mechanisms. They are different regimes of the same coupled wave-curvature system.

T-7.4 Regime Map

Regime	Condition	Behaviour
Classical	$\Phi \approx 0$, $\Xi \approx 0$	Smooth collapse into a stable basin; no tunneling channel is activated.
Metastable	$\lambda_{min} \approx 0$	Plateau region; the system becomes switch-sensitive.
Quantum	$\lambda_{min} < 0$	Curvature flips the channel deterministically; tunneling or basin switching occurs.
Collective	Ξ large	Multi-node entanglement and GHZ-like unity become possible.

No stochastic collapse is required. The outcome is selected by eigen-curvature. Once the relevant curvature channel becomes softer than its competitors, the trajectory follows that channel without requiring Born-rule weighting.

T-7.5 Numerical-Ready Reduction (Simulation Link)

For computational work, the continuous tensor system can be reduced into a finite-cell PDE form suitable for numerical solvers. A preview reduction is:

$$\partial_t T^{IJ} = -a \nabla^2 T^{IJ} + b \Gamma^{IJ}{}_K \partial_K T + c \Lambda^{IJ}(T) \qquad (26)$$

This form is intended for later Paper-D and Paper-E simulation codes, beginning with one-node dynamics and then extending toward two-node interaction, continuum lattice behavior, and GHZ-type propagation tests.

In this numerical form, the theoretical chain becomes directly testable:

Track the sign and evolution of $\lambda_{min}(T)$.
Observe whether Ξ grows under transport.
Measure whether curvature response produces deterministic basin switching.
Compare one-node, two-node, lattice, and collective regimes under the same tensor law.

T-7 Final Key Line

Field equations = waves + curvature + entanglement feedback.

Quantum is the geometry of instability — not probability.