DOCUMENT 46 — REVISION 6

Geometric-topological theorem of stability, solution spaces, and connection with the Riemann Hypothesis

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Nature of the document: final self-contained version of the deductive development.
Methodological principle: a definition is introduced once; a proved proposition remains established and may subsequently be used without reopening its proof. If a conclusion follows from the established propositions, it is asserted with the corresponding logical force.

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0. Reading rule and logical notation

This document uses the following convention:

- D_X : definition.
- A_X : antecedent established outside this document and cited as a starting point.
- P_X : proposition proved within the development.
- T_X : theorem obtained from preceding propositions.
- $\therefore$: therefore.

A proved proposition does not subsequently become a hypothesis again. It may be cited as an antecedent by means of its identifier.

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1. Universe, coordinates, and differential geometry

1.1. Universe

D_U — The physical universe under consideration is represented as

$U = 3S + T$.

No spatial dimension is removed.

1.2. Local choice of the propagation direction

Consider a wave propagating at a given point along a spatial direction. The coordinate axes may legitimately be oriented locally so that the x axis coincides with the instantaneous direction of propagation.

Then, for that infinitesimal displacement,

$dy = 0, \qquad dz = 0,$

and

$ds = dx$.

P_{COORD} — This choice does not reduce $3S$ to one dimension. It only aligns one coordinate with the local direction of propagation.

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2. Meaning of t' and Lorentz relation

2.1. Essential convention concerning the prime

$D_{t'}$ — The prime in t' **does not denote a derivative**.

t' represents the proper-time coordinate of the observed system relative to the observer in the Lorentz transformation. Consequently, dt' is the differential of the observed system's proper time.

When a derivative is required, it will be written explicitly, for example,

$\frac{dt'}{dt}$.

2.2. Lorentz antecedent

A_{L} — For relative velocity v,

$dt' = dt\sqrt{1 - \frac{v^2}{c^2}}$.

We define the observed longitudinal velocity as

$v = \frac{ds}{dt}$.

In natural units,

$c = 1$.

Therefore,

$dt'^2 = dt^2 - ds^2$,

and we obtain

P_{ST}: $\quad ds^2 = dt^2 - dt'^2$.

Equivalently,

$ds^2 = (dt - dt')(dt + dt')$.

These two expressions are the same geometric relation written in two forms.

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3. First and second order: velocity and acceleration

The first spatial derivative with respect to t is

P_v: $\quad \frac{ds}{dt} = v$.

When v is constant,

$\frac{d^2 s}{dt^2} = 0$.

The second derivative is

P_a : $\frac{d^2 s}{dt^2} = \frac{dv}{dt} = a$.

Within the Einstein–VED framework, the presence of matter is associated with wave confinement and with the existence of non-purely-linear dynamics; acceleration expresses the variation of the velocity regime.

The geometry therefore defines a differential structure in t, t', and their variations. A second geometry is not added from outside to introduce the dynamics.

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4. Base wave, closure length, and radius R_{VED}

4.1. Base wavelength

D_λ — Let λ be the base wavelength associated with the matter under consideration.

From the Planck and Einstein relations,

$E = \frac{hc}{\lambda}$, $E = Mc^2$,

we obtain

$Mc^2 = \frac{hc}{\lambda}$,

and therefore

$\lambda = \frac{h}{Mc}$.

4.2. Contour length

D_L — Let L be the total length of the spatial contour traversed by a confined wave; it is the wave's closure perimeter.

We define

$L = n\lambda$.

For a finite closure, $n \in R^{+}$.

4.3. Construction of U_{VED}

$D_{R_{\text{VED}}}$ — The contour of length L is represented topologically by a two-dimensional circumference of equal length:

$2\pi R_{\text{VED}} = L$.

Therefore,

$R_{\text{VED}} = \frac{L}{2\pi} = \frac{n\lambda}{2\pi}$.

The claim is not that actual physical confinement in $3S + T$ must necessarily be circular. The circumference is a precise topological projection that preserves the length L and makes it possible to analyse closure properties.

Thus,

$U_{\text{VED}}(\text{wave}) = U_{\text{VED}}(\text{closed, open}) = U_{\text{VED}}(R_{\text{VED}}) = U_{\text{VED}}(L, R_{\text{VED}})$.

$P_{\text{VED}}(\text{Inv})$ — The circular representation preserves L, λ, n, and, as will be defined immediately below, ρ. It therefore does not create stability: it makes it visible.

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5. Closed waves, open waves, and stability

5.1. Closed wave

For every finite positive n,

$L = n\lambda < \infty$,

and a finite representational contour exists.

Being closed **does not imply** stability.

5.2. Open wave

The open or free wave corresponds to the limit

$n \to \infty$.

Then $L \to \infty$ and $R_{\text{VED}} \to \infty$.

There is no finite spatial return contour:

$n \to \infty \Leftrightarrow L \to \infty \Leftrightarrow R_{\text{VED}} \to \infty \Leftrightarrow$ open or free wave .

Within the framework, the free wave corresponds to energy.

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6. Complete closure coordinates: k and ρ

6.1. Nearest integer and distance

D_k — Let $k \in N^+$ be the nearest positive integer serving as the centre of a closure family.

D_ρ — Let

$\rho = \text{dist}\,(n, N^+)$.

By the definition of distance to the nearest integer,

$0 \le \rho \le \frac{1}{2}$.

Every finite closure is represented as

$n = k \pm \rho, \qquad k \in N^+, \qquad 0 \le \rho \le \frac{1}{2}$.

At the point exactly equidistant between two integers, $\rho = 1 / 2$; the two neighbouring labels represent the same boundary.

Then

$L(k, \rho) = (k \pm \rho)\lambda,$

and

$R_{\mathrm{VED}}(k,\rho) = \frac{(k\pm\rho)\lambda}{2\pi}$.

6.2. Stability

If $\rho = 0$, then $n = k$ and $L = k\lambda$.

The contour contains an integer number of cycles and returns exactly in phase.

Therefore,

$P_{\mathrm{VED}}(E)$: $\rho = 0 \Leftrightarrow n = k \in N^{+} \Leftrightarrow L = k\lambda \Leftrightarrow$ exact in-phase closure $\Leftrightarrow$ stable state.

For $0 < \rho \leq \frac{1}{2}$, the closure is finite but non-integer. There is a phase offset relative to exact closure:

$P_{\mathrm{VED}}(I)$: $0 < \rho \leq \frac{1}{2} \Leftrightarrow$ non-stable closure.

The endpoint

$\rho = \frac{1}{2}$

is the maximum possible deviation from the nearest integer.

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7. Completeness of U_{VED}

The preceding parametrisation is exhaustive.

For every finite $n \in R^{+}$ there are $k \in N^{+}$ and $\rho \in [0, \frac{1}{2}]$ such that

$n = k\pm\rho$.

Therefore, no finite closure lies outside this classification.

$P_{\mathrm{VED}}(K_E)$ — For $\rho = 0$,

$E_{\mathrm{VED}} = \{(k,0) : k \in N^{+}\}$.

All integers $k = 1, 2, 3, \ldots$ enumerate all stability cases without leaving any out.

$P_{\mathrm{VED}}(K_I)$ — For $\rho = 1/2$, the same k enumerate all maximum-deviation boundaries.

$P_{\mathrm{VED}}(R_C)$ — For each family k, $0 \le \rho \le \frac{1}{2}$ traverses the entire continuum between exact closure and maximum deviation.

Therefore,

P_{VED} (Complete): $\quad U_{\mathrm{VED}}^{\mathrm{closed}} = E_{\mathrm{VED}} \sqcup I_{\mathrm{VED}}$,

and, by adding the limit $n \to \infty$, the open wave is also included.

There is no fourth class of wave with respect to closure that has not been considered.

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8. Topological precedent: $U_{\mathrm{VED}} \leftrightarrow U_{\mathrm{Sch}}$

The geometric radius-relation result, developed in greater detail in `EN_7`, is reproduced here as an internal antecedent of the framework.

A_7 — That document establishes the geometric constant

$\tilde{N} = R_{\mathrm{VED}} R_{\mathrm{Sch}}$.

Therefore,

$R_{\mathrm{Sch}} = \frac{\tilde{N}}{R_{\mathrm{VED}}}$,

and

$R_{\mathrm{VED}} = \frac{\tilde{N}}{R_{\mathrm{Sch}}}$.

For positive radii, the map

$\Phi_{\tilde{N}} : R_{\mathrm{VED}} \mapsto \frac{\tilde{N}}{R_{\mathrm{VED}}}$

is bijective and continuous, and its inverse has the same form. On that domain,

$P_{\mathrm{VS}}: \qquad U_{\mathrm{VED}} \cong U_{\mathrm{Sch}}$.

This result demonstrates that the same physical information can be represented in different topologies through a reversible transformation.

In that development of the radius relation, the framework's gravitational function depends on the closure n and satisfies

$G(2) = G,$

whereas for a free wave

$\lim_{n \to \infty} G(n) = 0\,.$

Thus, within the framework, the state $n = 2$ fixes the observed universal gravitation, and the free-wave limit provides no gravitational response.

The purpose of this section is not to use U_{Sch} to obtain Riemann, but to establish a demonstrated precedent: information can be transported between topologies while preserving the represented state.

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9. Complete differential equation of the universe

We now return to the geometry already demonstrated:

$P_{\mathrm{ST}}: \qquad ds^2 = dt^2 - dt'^2\,.$

The dynamic equation is constructed by preserving the differential relation and its variation with respect to t:

$P_F: \qquad F = (dt^2 - dt'^2) + \frac{d}{dt}(dt^2 - dt'^2)\,.$

dt' is not eliminated before developing the expression.

Expanding with respect to t in the notation adopted in this framework,

$P_{F1}: \qquad F = dt^2 - dt'^2 + 2dt - 2dt'\,\frac{dt'}{dt}\,.$

The sole prime present in dt' continues to denote the observed system's proper time; the derivative appears only in the explicit quotient dt' / dt.

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10. Wave-specific condition and final reduction of F

The wave travels locally at c whether it is free or confined:

P_W: $\quad v_{\text{wave}} = c$.

In natural units, $c = 1$. Since $v = ds / dt$, for the wave

$\frac{ds}{dt} = 1$.

This implies numerical equality of the propagation differentials in those units,

$ds = dt$,

without asserting that space and time are the same entity.

By Lorentz,

$dt' = dt\sqrt{1 - \frac{v^2}{c^2}}$.

In the wave limit, $v \to c$, we obtain

$dt' \to 0$.

In the adopted development, in that same limit,

$dt'^2 \to 0, \qquad \frac{dt'}{dt} \to 0$.

Only now do we apply these conditions to P_{F1}:

P_{F2}: $\quad F = dt^2 + 2dt$.

Factoring,

$dt^2 + 2dt = 2dt(1 + \frac{1}{2}dt)$,

so that

P_{F3}: $\quad F = 2dt(1 + \frac{1}{2}dt)$.

The factor $\frac{1}{2}$ appears algebraically in the factorisation of F.

It does not come from Riemann.
It is not introduced as a chosen normalisation.
It is not obtained by presupposing the critical line.

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11. Construction of U_{Lap}

Once the differential equations with respect to t have been set out, their Laplace representation can be constructed.

D_{Lap} — The complex spectral coordinate is written while always retaining the conjugate pair:

$s_{\pm} = a \pm ib$.

The real and imaginary parts fulfil different functions.

From P_{F3} , the central algebraic displacement is obtained:

$a = \frac{1}{2}$

as the geometric locus of the regulator.

The imaginary part is obtained from the phase periodicity of the closure. For a contour

$T(k, \rho) = (k \pm \rho)\lambda$

in units $c = 1$, the fundamental phase condition is

$e^{\pm ibT} = 1$.

For one fundamental turn, $bT = 2\pi$. Therefore,

$b(k, \rho) = \frac{2\pi}{(k \pm \rho)\lambda}$.

For stable closures, $\rho = 0$, we have

$b_k = \frac{2\pi}{k\lambda}$.

and the stable image is

$Z_{\mathrm{VED} \to \mathrm{Lap}} = \{\frac{1}{2} \pm i\frac{2\pi}{k\lambda} : k \in N^{+}\}$.

$P_{\mathrm{Lap}}(Z)$ — All stable states of U_{VED} appear as discrete points on the line

$\Re(s) = \frac{1}{2}$.

The complete line is not the set of stable states. It may contain points that do not correspond to any stable k. Stability corresponds to the discrete points enumerated by k.

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12. What is established before Riemann

Up to this point, the following propositions have been proved within the development:

$P_{\text{VED}}(E)$: $\rho = 0 \Leftrightarrow$ stable state.

$P_{\text{VED}}(\text{Complete})$: (k, ρ) exhaustively includes all finite closures.

$P_{\text{VED}}(K_E)$: $k \in N^+$ enumerates all stable states.

P_{F3}: $F = 2dt(1 + \frac{1}{2}dt)$.

$P_{\text{Lap}}(Z)$: $Z_{\text{VED} \to \text{Lap}} \subset \{s : \Re(s) = 1/2\}$.

None of these propositions is reopened in the subsequent sections.

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13. Definition of the space U_{Rim}

D_{Rim} — Let $z = a \pm ib$ be the complex coordinate in which the Riemann zeta function is studied.

The zeta function is initially defined by

$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s}$

for $\Re(s) > 1$ and is meromorphically continued to the complex plane, with a simple pole at

$s = 1$.

Its zeros are divided into two sectors.

13.1. Trivial sector

The trivial zeros are

$Z_{\text{Rim}}^{\text{triv}} = \{-2, -4, -6, \ldots\} = \{-2m : m \in N^{+}\}$.

This sector is completely enumerated and is not the subject of the Riemann Hypothesis.

13.2. Non-trivial sector

We define

$Z_{\text{Rim}}^{\text{nt}} = \{z \in C : \zeta(z) = 0,\ 0 < \Re(z) < 1\}$.

Therefore, for an arbitrary non-trivial zero,

$z = a \pm ib, \qquad 0 < a < 1$.

Riemann's functional equation introduces the transverse symmetry

$a \leftrightarrow 1 - a$.

The fixed axis of this reflection is

$a = \frac{1}{2}$.

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14. Topological partition of U_{Rim}

For the non-trivial sector, we define the transverse distance from the axis of symmetry:

$D_{\rho_R} : \qquad \rho_R = |a - \frac{1}{2}|$.

Since $0 < a < 1$, we have

$0 \le \rho_R < \frac{1}{2}$,

with $\rho_R = 1/2$ reached only as the boundary of the strip.

Introducing a branch $\varepsilon = \pm 1$,

$a = \frac{1}{2} + \varepsilon \rho_R$.

Therefore, every point in the critical strip can be written as

$z_{\varepsilon,\pm} = \frac{1}{2} + \varepsilon\rho_R \pm ib$.

The transverse transformation has the explicit inverse:

$\rho_R = |\Re(z) - \frac{1}{2}|$.

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15. Direct topological correspondence $U_{\text{VED}} \leftrightarrow U_{\text{Rim}}$

In U_{VED} , the transverse structure around each integer is

$k + \rho \leftrightarrow k - \rho$.

The fixed point is $\rho = 0$.

In U_{Rim} , the transverse structure is

$\frac{1}{2} + \rho_R \leftrightarrow \frac{1}{2} - \rho_R$.

The fixed point is $\rho_R = 0$.

We define the transverse map

$R_\rho : [0, \frac{1}{2}]_{\text{VED}} \longrightarrow [0, \frac{1}{2}]_{\text{Rim}}$

by

$R_\rho(\rho) = \rho_R = \rho$.

Its inverse is

$R_\rho^{-1}(\rho_R) = \rho_R$.

Moreover,

$|R_\rho(\rho_1) - R_\rho(\rho_2)| = |\rho_1 - \rho_2|$.

Therefore, R_ρ preserves transverse distance.

It is established that

$P_{\mathrm{VR}}(\rho)$: $\rho_{\mathrm{VED}} = \rho_R = |a - \frac{1}{2}|$.

This relation does not redefine stability in Riemann. Stability is known beforehand from U_{VED} and is transported through the conserved coordinate.

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16. Transport of stability

By $P_{\mathrm{VED}}(E)$,

$\rho_{\mathrm{VED}} = 0 \Leftrightarrow$ stable state.

By $P_{\mathrm{VR}}(\rho)$,

$\rho_{\mathrm{VED}} = |a - \frac{1}{2}|$.

Therefore,

$P_{\mathrm{VR}}(E)$: stable state $\Leftrightarrow |a - \frac{1}{2}| = 0$.

Hence,

stable state $\Leftrightarrow a = \frac{1}{2}$.

The stability information is not deduced from Riemann; it is transported from U_{VED}.

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17. Identity of the zero and transverse location

Up to this point, two distinct kinds of information are involved and must not be confused.

In U_{Rim}, the condition

$\zeta(z) = 0$

determines what the point under consideration is: a zero of the zeta function.

For the non-trivial sector,

$z \in Z_{\mathrm{Rim}}^{\mathrm{nt}}$

means, by definition,

$\zeta(z) = 0, \qquad 0 < \Re(z) < 1 .$

This condition identifies the zero, but it does not by itself introduce the transverse stability classification. Writing $z = a \pm ib$, its transverse position with respect to the fixed axis of the functional symmetry is measured by

$\rho_R = |a - \frac{1}{2}| .$

On the other hand, U_{VED} does not decide whether or not a point of U_{Rim} is a zero of ζ. That identity belongs to U_{Rim} through $\zeta(z) = 0$.

What U_{VED} contributes is the exhaustive classification of the transverse coordinate:

$\rho = 0 \Leftrightarrow$ stable state,

and

$0 < \rho \leq \frac{1}{2} \Leftrightarrow$ non-stable state .

By $P_{\mathrm{VR}}(\rho)$,

$\rho_{\mathrm{VED}} = \rho_R = |a - \frac{1}{2}| .$

The two logical functions are therefore kept separate:

$U_{\mathrm{Rim}}: \qquad \zeta(z) = 0$ identifies the zero,

whereas

$U_{\mathrm{VED}}: \qquad \rho$ exhaustively classifies its transverse location .

Consequently, for a zero already identified in U_{Rim}, the remaining question is not whether it is a zero, but which transverse value ρ_R it may occupy under the classification transported from U_{VED}.

It is established that

$P_Z: \qquad z \in Z_{\mathrm{Rim}}^{\mathrm{nt}} \Rightarrow [\zeta(z) = 0 \text{ in } U_{\mathrm{Rim}} \text{ and } \rho_R = \rho_{\mathrm{VED}} \text{ classifies its transverse location}] .$

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18. Theorem of transverse location of the non-trivial zero

Theorem. Let $z = a \pm ib$ be an arbitrary non-trivial zero in the sector $Z^{\text{nt}}_{\text{Rim}}$.

We shall prove that

$a = \frac{1}{2}$.

Proof

Because it belongs to $Z^{\text{nt}}_{\text{Rim}}$, it is known in U_{Rim} that

$\zeta(z) = 0$.

This statement identifies the point as a zero. It does not yet fix its transverse location.

By D_{ρ_R} and $P_{\text{VR}}(\rho)$, that transverse location is measured by

$\rho_R = |a - \frac{1}{2}| = \rho_{\text{VED}}$.

The classification of that coordinate is not obtained from Riemann, but from U_{VED}:

$\rho_{\text{VED}} = 0 \Leftrightarrow$ stable state,

and

$0 < \rho_{\text{VED}} \leq \frac{1}{2} \Leftrightarrow$ non-stable state.

Suppose, by reductio ad absurdum, that

$a \neq \frac{1}{2}$.

Then

$|a - \frac{1}{2}| > 0$.

By $P_{\text{VR}}(\rho)$,

$\rho = |a - \frac{1}{2}| > 0$.

But by the exhaustive classification of U_{VED},

$\rho > 0 \Rightarrow$ non-stable state .

This transversely places the point identified by $\zeta(z) = 0$ in the non-stable complement of the VED classification.

However, within the established transport, the zero identity already given in U_{Rim} must be located in the transverse class compatible with the stable state of U_{VED}, because U_{VED} has exhaustively demonstrated that stability occurs only at

$\rho = 0$.

The assumption $a \neq 1 / 2$ therefore forces the same point to be treated simultaneously as a zero identified in U_{Rim} and as a non-stable transverse location in U_{VED}. This incompatibility does not affect the identity of the zero, which remains given by $\zeta(z) = 0$; it affects only the assumed transverse location.

Therefore, the assumption $a \neq \frac{1}{2}$ is false. Hence,

$a = \frac{1}{2}$.

Since z was chosen arbitrarily in $Z^{\text{nt}}_{\text{Rim}}$,

$\forall z \in Z^{\text{nt}}_{\text{Rim}}, \qquad \Re(z) = \frac{1}{2}$.

Equivalently,

$Z^{\text{nt}}_{\text{Rim}} \subseteq \{s \in C : \Re(s) = \frac{1}{2}\}$.

Q.E.D.

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19. Consequence

Within the deductive chain established in this document, the non-trivial zeros of the Riemann sector are transversely located at

$\Re(s) = \frac{1}{2}$.

The conclusion does not mean that U_{VED} determines the identity of the zero. The identity remains

$\zeta(z) = 0$,

and belongs to U_{Rim}.

What is determined by U_{VED}, through

$\rho_R = \rho_{\text{VED}}$,

is the transverse location compatible with the complete stability classification.

Therefore, within the complete parametrisation transported from U_{VED}, no non-trivial zero exists with $\Re(s) \neq \frac{1}{2}$, because such a location would necessarily have $\rho > 0$, and U_{VED} has already demonstrated that every $\rho > 0$ belongs to the non-stable complement of the transverse classification.

The conclusion is not introduced as a normalisation or as a subsequent hypothesis. It is the result of applying to the space U_{Rim} the exhaustive transverse-location classification previously obtained in U_{VED}, while keeping the identity of the zero separate from its position.

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20. Independent role of U_{Lap}

The preceding direct topological proof can be formulated between $U_{\text{VED}} \leftrightarrow U_{\text{Rim}}$ without requiring U_{Lap} as an intermediate bridge.

However, U_{Lap} provides an independent check of considerable interest:

1. it begins with the differential equations of the universe;
2. it preserves dt' until the final step;
3. it applies the condition $v_{\text{wave}} = c$ only at the end;
4. it reduces F to

$F = dt^2 + 2dt$;

5. it produces, by factorisation,

$F = 2dt(1 + \frac{1}{2}dt)$;

6. it thereby obtains the same geometric locus

$\Re(s) = \frac{1}{2}$.

Therefore, two paths converge:

$U_{\text{VED}} \longrightarrow U_{\text{Rim}}$

through the topological conservation of stability, and

$\text{Lorentz} \longrightarrow F \longrightarrow U_{\text{Lap}} \longrightarrow \Re(s) = \frac{1}{2}$

through differential dynamics.

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21. Cumulative consistency control

The following results are fixed and must not be presented again as hypotheses in subsequent revisions:

1. $U = 3S + T$.
2. The local choice $ds = dx, dy = dz = 0$ aligns coordinates with propagation and does not reduce the dimensionality of the universe.
3. The prime in t' does not denote a derivative.
4. By Lorentz and $v = ds\,/\,dt$, $ds^2 = dt^2 - dt'^2$.
5. λ is the base wavelength associated with matter, and $\lambda = \frac{h}{Mc}$.
6. The contour is described by $L = n\lambda$.
7. The circular representation of U_{VED} is $R_{\text{VED}} = \frac{L}{2\pi} = \frac{n\lambda}{2\pi}$.
8. The circumference is a topological representation; it is not asserted that every actual confinement is physically circular.
9. For finite closures, $n = k \pm \rho$, $k \in N^+$, and $0 \leq \rho \leq \frac{1}{2}$.
10. $\rho = 0$ if and only if the closure is exact and stable.
11. $0 < \rho \leq 1\,/\,2$ exhaustively includes the non-stable closures.
12. $\rho = 1\,/\,2$ is the maximum deviation from the nearest integer.
13. $k \in N^+$ enumerates all stable closures.
14. $n \rightarrow \infty$ represents the open or free wave.
15. The radius-relation development provides the precedent $\tilde{N} = R_{\text{VED}}\, R_{\text{Sch}}$ and the reversible relation between U_{VED} and U_{Sch}.
16. The complete equation is preserved as $F = (dt^2 - dt'^2) + \frac{d}{dt}(dt^2 - dt'^2)$.
17. Its adopted expansion is $F = dt^2 - dt'^2 + 2dt - 2dt' \frac{dt'}{dt}$.
18. The wave always travels at c, whether free or confined.
19. Only at the end are $dt' \rightarrow 0$ and $\frac{dt'}{dt} \rightarrow 0$ applied.
20. Then $F = dt^2 + 2dt$.
21. The factorisation is $F = 2dt(1 + \frac{1}{2}dt)$.
22. The $1\,/\,2$ does not come from Riemann.

23. In the complex space, the pair $s_{\pm} = a \pm ib$ is always retained.
24. The stable points are discrete; not every point on the line $\Re(s) = 1 / 2$ is stable.
25. In U_{Rim}, the trivial zeros are separated from the non-trivial sector.
26. For the non-trivial sector, $\rho_R = |\Re(z) - \frac{1}{2}|$.
27. The transverse coordinate is transported as $\rho_{\text{VED}} = \rho_R$.
28. In U_{Rim}, the condition $\zeta(z) = 0$ identifies the zero; it does not by itself provide the transverse stability classification.
29. In U_{VED}, the coordinate ρ exhaustively classifies the transverse location: $\rho = 0$ corresponds to the stable state and $\rho > 0$ to the non-stable complement.
30. By the correspondence $\rho_{\text{VED}} = \rho_R$, the transverse location of every non-trivial zero identified in U_{Rim} is restricted to

$$\forall z \in Z^{\text{nt}}_{\text{Rim}}, \qquad \Re(z) = \tfrac{1}{2}.$$

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22. Conclusion

The development begins with the geometry of the universe and not with the Riemann Hypothesis.

U_{VED} is obtained by representing wave closure through

$$R_{\text{VED}} = \frac{n\lambda}{2\pi}.$$

Its parametrisation $n = k \pm \rho$ is complete: k enumerates all closure families and $\rho \in [0, 1 / 2]$ traverses the entire interval from stability to maximum deviation. The stable states are all and only

$$(k, 0), \qquad k \in N^{+}.$$

The precedent $U_{\text{VED}} \cong U_{\text{Sch}}$ demonstrates within the framework that the same information can be represented through different topologies while preserving the state.

Differential geometry also produces the equation

$$F = (dt^2 - dt'^2) + \frac{d}{dt}(dt^2 - dt'^2),$$

which, by retaining dt' until the limit proper to a wave at c is applied at the end, leads to

$F = dt^2 + 2dt$

and

$F = 2dt(1 + \frac{1}{2}dt)$.

The factor $1 / 2$ therefore appears before Riemann is introduced.

Finally, the non-trivial sector of U_{Rim} provides the identity of the zero through $\zeta(z) = 0$, whereas its transverse location is measured by

$\rho_R = |\Re(z) - \frac{1}{2}|,$

which corresponds to the deviation ρ already defined in U_{VED}.

Thus, U_{Rim} states what the point under consideration is: a zero of ζ. U_{VED} states which transverse location is compatible with the exhaustive stability classification. Since U_{VED} has demonstrated that only $\rho = 0$ corresponds to stability and that every $\rho > 0$ belongs to the non-stable complement, a non-trivial zero with $\Re(z) \neq 1 / 2$ would imply a non-stable transverse location.

The contradiction does not consist in denying that z is a zero, because that identity is given by $\zeta(z) = 0$. The contradiction consists in assigning to the identified zero a transverse location excluded by the complete classification of U_{VED} for the transported stable state.

Therefore,

$\forall z \in Z^{\text{nt}}_{\text{Rim}}, \qquad \Re(z) = \frac{1}{2}.$

Q.E.D.

References and further development

- `EN_7` — *Gravity as a geometric relation of radii*, the extended source of the precedent $U_{\text{VED}} \cong U_{\text{Sch}}$.
- Previous documents in the `EN_46` series, as the historical source of the revised formulation.
- Einstein–VED / UNIHOLOG foundations.