SST Rosetta: VAM-to-SST Translation Guide for Symbols, Macros, and Constants

Omar Iskandarani *

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Abstract

This note provides a rigorous nomenclature concordance between the legacy VAM presentation and the Swirl–String Theory (SST) house style. It establishes a one-to-one mapping of symbols and terminology while preserving the underlying kinematics, operators, and calibrated constants. In particular, it fixes the canonical SST equalities

$$\rho_E = \tfrac{1}{2}\,\rho_f\,\|\mathbf{v}_{\circlearrowleft}\|^2, \qquad \rho_m = \rho_E/c^2, \qquad K = \frac{\rho_{\mathrm{core}}\,r_c}{\|\mathbf{v}_{\circlearrowleft}\|\big|_{r=r_c}} = \frac{\rho_{\mathrm{core}}\,r_c}{\|\mathbf{v}_{\circlearrowleft}\|\big|_{r=r_c}}, \quad \rho_f = K\,\Omega,$$

and records that all published numerical values for $\|\mathbf{v}_{\circlearrowleft}\|\big|_{r=r_c}$ (defined here as $\|\mathbf{v}_{\circlearrowleft}\|\big|_{r=r_c}$), r_c, ρ_{core}, the background density, and the sectoral force bounds carry over unchanged. The document includes compact translation tables (fields/kinematics/operators; densities/velocities/coarse–graining; global scales) and a minimal macro layer (`\rhoF`, `\rhoE`, `\rhoM`, `\rhoC`, `\vswirl`, `\vnorm`) to prevent notation drift in large projects. Legacy wording is restricted to historical citations; narrative prose adopts the neutral SST vocabulary (e.g., *foliation*, *swirl string*) without altering the mathematics. Compatibility is ensured both for standalone use (title page + metadata) and for modular inclusion (`\providecommand` guards and no additional package requirements). The result is a drop-in "translation guide" that guarantees dimensional consistency, unambiguous symbol usage, and reproducible cross-referencing across manuscripts that span the VAM→SST transition.

* Independent Researcher, Groningen, The Netherlands
Email: info@omariskandarani.com
ORCID: 0009-0006-1686-3961
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1 SST–VAM Translation and Constant Overlaps (Extended)

Canonical equalities (SST form)

$$\rho_E = \tfrac{1}{2}\,\rho_f\,\|\mathbf{v}_{\circlearrowleft}\|^2, \qquad \rho_m = \rho_E/c^2,$$
$$K = \frac{\rho_{\text{core}}\,r_c}{\|\mathbf{v}_{\circlearrowleft}\|\,|_{r=r_c}} = \frac{\rho_{\text{core}}\,r_c}{\|\mathbf{v}_{\circlearrowleft}\|\,|_{r=r_c}}, \qquad \rho_f = K\,\Omega.$$

Dimensional check

$$\begin{aligned}
[\rho_f] &= \mathrm{kg\,m^{-3}} \\
[\|\mathbf{v}_{\circlearrowleft}\|] &= \mathrm{m\,s^{-1}} \\
[\rho_E] &= \mathrm{J\,m^{-3}} \\
[\rho_m] &= \mathrm{kg\,m^{-3}} \\
[K] &= \mathrm{kg\,m^{-3}\,s}
\end{aligned}$$

Chronos–Kelvin invariant (added for completeness)

$$\frac{D}{Dt}(R^2\omega) = 0 \quad \text{(incompressible, inviscid, barotropic, no reconnection).}$$

(Kelvin/Helmholtz circulation conservation in SST wording; see [1, 2, 3, 4].)

Temporal Ontology in SST

We distinguish absolute parameter time $\mathcal{N}$ (preferred foliation label), external observer time τ, and internal clocks carried by swirl strings: a phase accumulator $S(t)$ and a loop "proper time" T_s. These appear in the field equations and separate global synchronization from local rotational dynamics.

$\mathcal{N}$	Absolute time (foliation)	Global causal parameter
ν_0	Now-point	Localized synchronization label
τ	External/chronos time	Measured time of external observer
$S(t)$	Swirl clock	Internal phase memory along a string
T_s	String proper time	Loop-duration functional
$\mathbb{K}$	Kairos event	Topological/phase transition moment

Fields, kinematics, operators (mapping)

VAM (legacy)	SST (house)	Meaning	Units	Overlap
"æther time"	absolute time parametrization	foliation time label	—	Yes
$T(x)$	$T(x)$	scalar clock field	—	Yes
u_μ (unit "æther" vector)	u_μ (unit time-like field)	$u_\mu = \partial_\mu T/\sqrt{-g^{\alpha\beta}\partial_\alpha T\partial_\beta T}$	—	Yes
"vortex line(s)"	swirl string(s)	object name only	—	Yes
$B_{\mu\nu},\ H_{\mu\nu\rho}$	same	Kalb–Ramond 2-form; $H = \partial_{[\mu}B_{\nu\rho]}$	—	Yes
W_μ	W_μ	coarse-grained frame connection	—	Yes
$C(K),\ L(K),\ \mathcal{H}(K)$	same	crossing #, ropelength, hyperbolic proxy	—	Yes

Densities, velocities, coarse–graining (mapping)

VAM (legacy)	SST (macro)	Meaning	Units	Overlap
$\rho_0,\ \rho_{æ}^{(\text{fluid})}, \rho_{æ}^{(\text{vacuum})}$	$\rho_f, \rho_f^{\text{bg}}$ or $\rho_f^{(0)}$	effective fluid density	$\mathrm{kg\,m^{-3}}$	Yes
$\rho_{æ}^{(\text{core})}, \rho_{æ}^{(\text{mass})}$	ρ_{core}	core/material density	$\mathrm{kg\,m^{-3}}$	Yes
$\rho_{æ}^{(\text{energy})}$	ρ_E (or $\rho_{\text{core}}c^2$)	energy density	$\mathrm{J\,m^{-3}}$	Yes
C_e (tangential)	$\|\mathbf{v}_{\circlearrowleft}\|\,\|_{r=r_c}$	characteristic swirl speed (= $\|\mathbf{v}_{\circlearrowleft}\|$ at $r = r_e$)	$\mathrm{m\,s^{-1}}$	Yes
C_e (field form)	$\mathbf{v}_{\circlearrowleft}$	swirl-velocity *vector field*	$\mathrm{m\,s^{-1}}$	Add
C_e (scalar use)	$\|\mathbf{v}_{\circlearrowleft}\|\,\|_{r=r_c}$	core magnitude of $\mathbf{v}_{\circlearrowleft}$	$\mathrm{m\,s^{-1}}$	Add
$K = \dfrac{\rho^{(\text{mass})}r_c}{C_e}$	$K = \dfrac{\rho_{\text{core}}\,r_c}{\|\mathbf{v}_{\circlearrowleft}\|\,\|_{r=r_c}}$	coarse–graining coefficient	$\mathrm{kg\,m^{-3}\,s}$	Add
Ω	Ω	leaf angular rate	$\mathrm{s^{-1}}$	Yes

Global scales and bounds

VAM (legacy)	SST (house)	Meaning	Units	Overlap
$F^{\max}$ (Coulomb)	$\mathrm{F}^{\max}_{\mathrm{EM}}$	Coulomb-sector bound	N	Yes
$F^{\max}_{\mathrm{gr}}$ (Universal)	$\mathrm{F}^{\max}_{\mathrm{G}}$	gravitational/universal bound	N	Yes
Γ	Γ	loop circulation	$\mathrm{m^2\,s^{-1}}$	Yes
$\Omega_R,\ \Omega_c$	same	outer rigid vs. core spin	$\mathrm{s^{-1}}$	Yes

Numeric overlaps (published values)

Quantity	Symbol (SST)	Value	Units
Characteristic swirl speed	$\|\mathbf{v}_{\circlearrowleft}\|\big\|_{r=r_c}$ $(\equiv \|\mathbf{v}_{\circlearrowleft}\|\big\|_{r=r_c})$	1,093,845.63	$\mathrm{m\,s^{-1}}$
Core radius	r_c	$1.40897017 \times 10^{-15}$	m
Core density	ρ_{core}	$3.8934358266918687 \times 10^{18}$	$\mathrm{kg\,m^{-3}}$
Background density	ρ_f^{bg}	7.0×10^{-7}	$\mathrm{kg\,m^{-3}}$
Max Coulomb force	$\mathrm{F}^{\max}_{\mathrm{EM}}$	29.053507	N
Max universal force	$\mathrm{F}^{\max}_{\mathrm{G}}$	3.02563×10^{43}	N

Macro glossary (house style)

Use the macros to avoid drift:

$$\rho_f \text{ (effective density)}, \quad \rho_E \text{ (energy density)}, \quad \rho_m \text{ (mass-equivalent)}$$

ρ_{core} (core density), $\mathbf{v}_{\circlearrowleft}$ (swirl velocity vector), $\|\mathbf{v}_{\circlearrowleft}\| = \|\mathbf{v}_{\circlearrowleft}\|$ (speed magnitude at a point).

Energy vs mass-equivalent (clarification). ρ_E is an *energy density*; $\rho_m = \rho_E/c^2$ is the corresponding local mass-equivalent. *Note.* ρ_{core} is a calibration *constant*. The mass-equivalent density is a *field* $\rho_m(x) = \rho_E(x)/c^2$. In the core-saturation evaluation $\rho_E^{\mathrm{core}} = \rho_{\mathrm{core}}\,c^2$, one has $\rho_m^{\mathrm{core}} = \rho_{\mathrm{core}}$.

Prose guardrails (rebrand policy)

Use *foliation* and *swirl string(s)* in narrative text. Reserve legacy words ("æther", "vortex") strictly for quoting historical titles or citations. Retain *vorticity* as standard.

Sentence rewrites (examples)

Legacy: "The æther sector fixes the vortex core density."
SST: "The *foliation* sector fixes the *core density* ρ_{core} of the swirl string."
Legacy: "Kelvin's vortex theorem implies conserved $R^2\omega$."
SST: "Kelvin's *circulation* theorem implies $\frac{D}{Dt}(R^2\omega) = 0$ under incompressible, inviscid, barotropic flow."

Scale-dependent Effective Densities in SST

Effective densities (house style).

$$\rho_f \equiv \text{effective fluid density}, \qquad \rho_E \equiv \tfrac{1}{2}\rho_f\,\|\mathbf{v}_{\circlearrowleft}\|^2 \quad \text{(swirl energy density)},$$

$$\rho_m \equiv \rho_E/c^2 \quad \text{(mass-equivalent density)}.$$

Background value: $\rho_f^{\mathrm{bg}} \approx 7.0 \times 10^{-7}\ \mathrm{kg\,m^{-3}}$. Core (material) density: $\rho_{\mathrm{core}} \approx 3.8934358267 \times 10^{18}\ \mathrm{kg\,m^{-3}}$. Hence core energy density

$$\rho_E^{\mathrm{core}} = \rho_{\mathrm{core}}\,c^2 \approx 3.499 \times 10^{35}\ \mathrm{J\,m^{-3}}.$$

Radial profile (phenomenology). It is convenient to model the near-core energy density with an exponential relaxation to the background:

$$\rho_E(r) = \rho_E^{\mathrm{bg}} + \left(\rho_E^{\mathrm{core}} - \rho_E^{\mathrm{bg}}\right) e^{-r/r_*},$$

with a microscopic decay scale r_* (fit parameter). This empirical profile does not replace the exact tube energetics below.

String energetics (Rankine core + irrotational envelope). For a core of radius r_c and length ℓ with solid-body rotation $v_\phi(r) = \Omega r$ for $r \le r_c$,

$$E_{\mathrm{core}} = \int_0^{r_c} \frac{1}{2}\,\rho_f\,(\Omega r)^2\,(2\pi r\,\ell)\,dr = \frac{\pi}{4}\,\rho_f\,\Omega^2\,r_c^4\,\ell.$$

Outside the core, $v_\phi(r) = \Gamma/(2\pi r)$ with $\Gamma = 2\pi\Omega r_c^2$, giving the slender-tube envelope term

$$E_{\mathrm{env}} \simeq \frac{\rho_f\,\Gamma^2}{4\pi}\,\ell\,\ln\frac{R}{r_c},$$

where R is an outer cutoff set by the nearest boundary or neighboring strings. Both contributions are standard in vortex-tube energetics (core + Biot–Savart envelope).

Coarse-graining. At macroscales, we use the canonical identity

$$K = \frac{\rho_{\mathrm{core}}\,r_c}{\|\mathbf{v}_{\circlearrowleft}\|\big|_{r=r_c}} = \frac{\rho_{\mathrm{core}}\,r_c}{\|\mathbf{v}_{\circlearrowleft}\|\big|_{r=r_c}}, \qquad \rho_f = K\,\Omega_{\mathrm{leaf}}.$$

where Ω_{leaf} is a coarse-grained (leaf-averaged) angular rate. Numerically, $\Omega_{\mathrm{leaf}} \sim 10^{-4}\,\mathrm{s}^{-1}$ in the Canon fit; it must not be confused with the microscopic core rate below.

2 Layered Time Scaling from Swirl Dynamics

Adopt the SR-like local rule

$$\frac{d\tau}{dt} = \sqrt{1 - \frac{v_\phi^2(r)}{c^2}}.$$

With a Rankine profile,

$$v_\phi(r) = \begin{cases} \Omega_{\mathrm{core}}\,r, & r \le r_c, \\ \dfrac{\Gamma}{2\pi r}, & r \ge r_c, \end{cases} \qquad \Gamma = 2\pi\Omega_{\mathrm{core}}\,r_c^2.$$

Continuity at $r = r_c$ gives $v_\phi(r_c) = \Omega_{\mathrm{core}}\,r_c \equiv \|\mathbf{v}_{\circlearrowleft}\|\big|_{r=r_c} = \|\mathbf{v}_{\circlearrowleft}\|\big|_{r=r_c}$, hence

$$\Omega_{\mathrm{core}} = \frac{\|\mathbf{v}_{\circlearrowleft}\|\big|_{r=r_c}}{r_c} = \frac{\|\mathbf{v}_{\circlearrowleft}\|\big|_{r=r_c}}{r_c} \approx \frac{1.09384563 \times 10^6}{1.40897017 \times 10^{-15}} \approx 7.763 \times 10^{20}\,\mathrm{s}^{-1}.$$

Thus

$$\frac{d\tau}{dt} = \begin{cases} \sqrt{1 - \dfrac{\Omega_{\mathrm{core}}^2\,r^2}{c^2}}, & r \le r_c, \\ \sqrt{1 - \dfrac{\Gamma^2}{4\pi^2 c^2 r^2}}, & r \ge r_c. \end{cases}$$

The earlier ansatz $d\tau/d\bar{t} = e^{-r/r_c}$ can be used only as a phenomenological fit; it does not follow from the SR-like form unless one imposes a special $v_\phi(r)$ inconsistent with Rankine.

References

[1] H. von Helmholtz. Über integrale der hydrodynamischen gleichungen, welche den wirbelbewegungen entsprechen. *J. Reine Angew. Math.*, 55:25–55, 1858.

[2] W. Thomson (Lord Kelvin). On vortex motion. *Trans. R. Soc. Edinburgh*, 25:217–260, 1869.

[3] G. K. Batchelor. *An Introduction to Fluid Dynamics*. Cambridge University Press, 1967.

[4] P. G. Saffman. *Vortex Dynamics*. Cambridge University Press, 1992.