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

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

and records that all published numerical values for v_s, r_c, $\rho_{\rm core}$, 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)

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

Dimensional check

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

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
ρ_0, $\rho_{æ}^{(\text{fluid})}$, $\rho_{æ}^{(\text{vacuum})}$	ρ_f, ρ_f^{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)	v_s	characteristic swirl speed ($= \|\mathbf{v}_{\circlearrowleft}\|$ at $r = r_e$)	$\mathrm{m\,s^{-1}}$	Yes
$K = \dfrac{\rho^{(\text{mass})} r_c}{C_e}$	$K = \dfrac{\rho_{\text{core}} r_c}{v_s}$	coarse–graining coefficient	$\mathrm{kg\,m^{-3}\,s}$	Yes
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	v_s	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	$F^{\max}_{\mathrm{EM}}$	29.053507	N
Max universal force	$F^{\max}_{\mathrm{G}}$	3.02563×10^{43}	N

Macro glossary (house style)

Use the macros to avoid drift:

ρ_f (effective density), ρ_E (energy density), ρ_m (mass-equivalent), ρ_{core} (core density), $\mathbf{v}_{\circlearrowleft}$ (swirl velocit

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).

$\rho_f \equiv$ effective fluid density, $\rho_E \equiv \frac{1}{2}\rho_f\,\|\mathbf{v}_{\circlearrowleft}\|^2$ (swirl energy density), $\rho_m \equiv \rho_E/c^2$ (mass-equivalent

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 $r \le r_c$,

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

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

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

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

$$K = \frac{\rho_{\text{core}}\,r_c}{v_s}, \qquad \rho_f = K\,\Omega_{\text{leaf}}.$$

where Ω_{leaf} is a coarse-grained (leaf-averaged) angular rate. Numerically, $\Omega_{\text{leaf}} \sim 10^{-4}\,\text{s}^{-1}$ 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,

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

Continuity at $r = r_c$ gives $v_\phi(r_c) = \Omega_{\text{core}}\,r_c \equiv v_s$, hence

$$\Omega_{\text{core}} = \frac{v_s}{r_c} \approx \frac{1.09384563 \times 10^6}{1.40897017 \times 10^{-15}} \approx 7.763 \times 10^{20}\ \text{s}^{-1}.$$

Thus

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

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.