Appendix: The Role of C_e^2 in VAM Dynamics

In the Vortex Æther Model (VAM), the constant C_e — the core tangential swirl velocity — plays a role analogous to the speed of light c in relativity. It governs the scale at which internal vortex motion couples to inertial effects, mass, and time evolution. Its square, C_e^2, appears throughout the theory as a natural denominator wherever kinetic, energetic, or gravitational effects emerge.

1. Interpretation of C_e^2

- **Inertia Coupling:** Swirl-induced mass depends on energy-like terms normalized by C_e^2, mirroring $E = mc^2$ in special relativity.
- **Time Dilation:** Local time is modified by swirl velocity as:

$$d\tau = dt \cdot \sqrt{1 - \frac{\omega^2 r^2}{C_e^2}}$$

- **Swirl Mass Generation:** Energy per unit volume from vortex motion ($\sim \frac{1}{2}\rho v^2$) is converted to mass via C_e^2.
- **Gravitational Coupling:** Appears in the VAM expression for G, derived from vortex coupling:

$$G \sim \frac{C_e c^5 t_p^2}{2 F_{\max} r_c^2}$$

Thus, C_e^2 is fundamental to scaling rotational energy into inertial and gravitational analogues in the VAM framework.

2. Table of Expressions Involving C_e^2

3. Symbolic Equivalence $C_e^2 \leftrightarrow c^2$

VAM exhibits a direct analogue to relativistic dynamics where C_e^2 plays the same role as c^2:

Time Dilation Analogy:

$$\text{Special Relativity:} \quad d\tau = dt \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

$$\text{VAM Swirl Clock:} \quad d\tau = dt \cdot \sqrt{1 - \frac{v_{\text{swirl}}^2}{C_e^2}}, \quad v_{\text{swirl}} = \omega r$$

Mass-Energy Equivalence:

$$\text{Relativity:} \quad E = mc^2$$

$$\text{VAM:} \quad E = mC_e^2 \Rightarrow m = \frac{\frac{1}{2}\rho v^2}{C_e^2}$$

Gravitational Redshift Analogy:

$$\text{GR:} \quad g_{tt} \approx 1 + \frac{2\Phi}{c^2}$$

$$\text{VAM:} \quad g_{tt}^{\text{eff}} \approx 1 - \frac{v^2}{C_e^2}$$

Summary Equivalence Table: We conclude that:

$$\boxed{C_e^2 \longleftrightarrow c^2}$$

This symbolic equivalence formalizes the deep analogy between relativistic spacetime curvature and the VAM framework of swirl-induced gravitational behavior.

Expression	**Physical Meaning**	**VAM Role**
$\frac{r_c}{C_e^2}$	Core radius over swirl velocity squared	Temporal inertia scaling
$\frac{F_{\max}}{C_e^2}$	Max force per swirl energy unit	Force–mass–energy coupling
$\frac{1}{2}\rho v^2/C_e^2$	Energy density to mass conversion	Inertial mass from kinetic field
$\frac{\omega^2 r^2}{C_e^2}$	Time dilation correction	Vortex-clock slowdown
$\frac{8\pi\rho_{\text{æ}} r_c^3}{C_e}$	VAM prefactor	Total mass contribution per vortex

Table 1: Representative appearances of C_e^2 in core VAM expressions.

Quantity	**Relativistic (GR)**	**VAM Equivalent**
Limiting speed	c	C_e
Mass-energy conversion	$E = mc^2$	$E = mC_e^2$
Time dilation	$\sqrt{1 - v^2/c^2}$	$\sqrt{1 - v^2/C_e^2}$
Gravitational potential scaling	Φ/c^2	v^2/C_e^2

Table 2: Mapping of relativistic quantities to their vortex-based analogues in VAM.