

ADDENDA v9.4 HONESTA EN - Tau vs V_min

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Title: Tau Scaling vs V_min - Why Physical Cutoff Prevents Mathematical Blow-up

OpenAI Theorem 1.1 scaling: $\tau=1-t \rightarrow 0$, $l_r \sim \tau^{1/2}$, $l_z \sim \tau^{1/2-h}$, $Vol \sim \tau^{3/2-h} \rightarrow 0$, $|u_\theta| \sim \tau^{-1/2-h} \rightarrow \infty$, $E_{core} \sim \tau^{1/2-3h} \rightarrow 0$ for $h < 1/6$. Angular Reynolds $Re_\theta \sim \tau^{-h} \rightarrow \infty$, radial $Re_r = O(1)$. Energy finite because volume collapses faster.

Pulse construction: oscillatory waves on auxiliary torus T^2 zero mean but non-zero flux $\langle w r_\theta \rangle$ cancels singular background stress Prop 7.5, 9.5, residual flat $O(q^N)$, localization X_χ , force $f=R(u,p)$ smooth compact.

UAT regularization: $\rho_{max}=5.155e96 \text{ kg/m}^3$, $V_{min}=L_P^3=4.22e-105 \text{ m}^3$, $\epsilon_{kin}=0.5 \rho |v|^2 \leq \rho_{max} c^2 \Rightarrow |v|_{max} = \sqrt{2 \rho_{max} c^2 / \rho} = 9.66e56$ finite, corrected from v1 1.015e47 missing c^2 . Velocity bound alone does NOT imply smoothness, needs $\nu_{eff}(l)=\nu_0(1+(L_P/l)^\alpha) \rightarrow \infty$ as $l \rightarrow L_P$, controlling BKM integral.

When l_r, l_z approach L_P , Vol cannot go below V_{min} . Then $E_{core_phys}=0.5 \rho |v|^2 V_{min} \sim \tau^{-1-2h} V_{min} \rightarrow \infty$ violating $\rho_{max} c^2$. Contradiction $\Rightarrow$ cutoff stops blow-up.

Conclusion: Pure forced NS $\rightarrow$ blow-up possible mathematically (OpenAI C/D). UAT-regularized NS with V_{min} and $\nu_{eff} \rightarrow$ smooth physically. Same as fly/human filter Note_03_08_2026: Musca 200-250Hz vs human 50-60Hz. Real time anchored to membrane Bit0/Bit1, $R_{geom}=0.279182$ residual 8 dephased axes $\Delta\theta=43.515 \text{ deg}$, $2R_{geom}=0.558364$, cycle 348.12 deg $\epsilon=11.88 \text{ deg}=3.3\%$ arrow-of-time.

Historical note: v1 Oct 2025/Feb 2026 DOI 18509390 is historical concept, not formal development. Withdraws priority claim over OpenAI mathematical theorem. If OpenAI validated, this work provides physical mechanism nature would use.

