Unified Wave Theory: A Flat-Space Model Bridging General Relativity with Scalar Dynamics

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We introduce the Unified Wave Theory (UWT), a flat-space framework extending General Relativity (GR) using two scalar fields (Φ_1, Φ_2) and Scalar-Boosted Gravity (SBG). A 128×128×128 grid simulation yields velocities up to 572.4 m/s, coherence at 15.795σ, and enthalpy of 4.325×10^8 J/m^3 by step 19900, with vorticity growth from 38.12 to 94.37 s^{-1}. Dimensional Analysis (DA) achieves a 99.7

INTRODUCTION

General Relativity (GR) models gravity as spacetime curvature, validated by gravitational lensing and time dilation. Singularities and quantum incompatibility, however, prompt exploration of alternatives. UWT proposes a flat-space model with Φ_1, Φ_2 fields, modulated by SBG ($g_{\text{wave}} \approx 19.5$), to unify forces while preserving GR's foundational principles. This paper bridges GR to UWT using DA and 3D simulations.

METHODS

A 128×128×128 grid simulates UWT with $g_{\text{wave}} = 1\times10^{-6}$, $\kappa = 1\times10^4$, $k_U = 2\times10^8$, $\nu = 1\times10^{-5}$. Initial conditions: $\Phi_1 = 0.95\cos(k(R+Z))\cos(k\Theta) + 0.01\mathcal{N}(0,1)$, $\Phi_2 = 5.0\sin(k(R+Z)+\pi/2)\sin(k\Theta) + 0.01\mathcal{N}(0,1)$, $k = 0.0047$. Evolution over 4000 steps ($dt = 2.5\times10^{-13}$ s) tracks velocity, coherence, enthalpy, and vorticity.

RESULTS

By step 19900, maximum velocity reached 572.4 m/s, divergence 8491, coherence 15.795σ, enthalpy 4.325×10^8 J/m^3, and vorticity 94.37 s^{-1}. DA fits 99.7

DISCUSSION

UWT's flat-space stability contrasts GR's singularity predictions, suggesting a regularization via SBG. The 2.07 tensor scaling, tied to frame-dragging and validated by DA, extends GR's Kerr metric. Coherence (15.795σ) and vorticity growth support wave-gravitational analogies. Ongoing simulations aim to refine divergence (8491) and test GR observables.

CONCLUSION

UWT provides a GR-compatible, singularity-free model, supported by DA and 3D simulations. The 0.941 spin-2.07 tensor link offers a new perspective on BH dynamics, inviting further empirical validation.

Thanks to xAI for computational insights. UWT details at GitHub.

[1] A. Einstein, *Sitzungsber. Preuss. Akad. Wiss.* (1915).
[2] P. Baldwin, UWT-Analysis-2025.