DWARF Side Test: Perpendicular Planet Orbit via Wake Entrapment

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May, 2025

Abstract

We present a simulation-based test under the DWARF (Dynamic Wake Accretion in Relativistic Fluids) framework to explore the natural emergence of a perpendicular exoplanet orbit. Our results demonstrate that a structured orthogonal wake field is sufficient to entrap and stabilize planetary bodies in non-coplanar, inclined orbits—without requiring catastrophic scattering or perturbation.

1 Simulation Setup

A central mass (1 solar mass) generates a standard protoplanetary-like wake in the XY-plane. A secondary orthogonal inflow is introduced along the Z-axis to simulate a secondary gravitational field or wake tunnel. Tracers were seeded both in-plane and perpendicular to test orbit formation and long-term stability.

2 Results

2.1 Angular Momentum Evolution

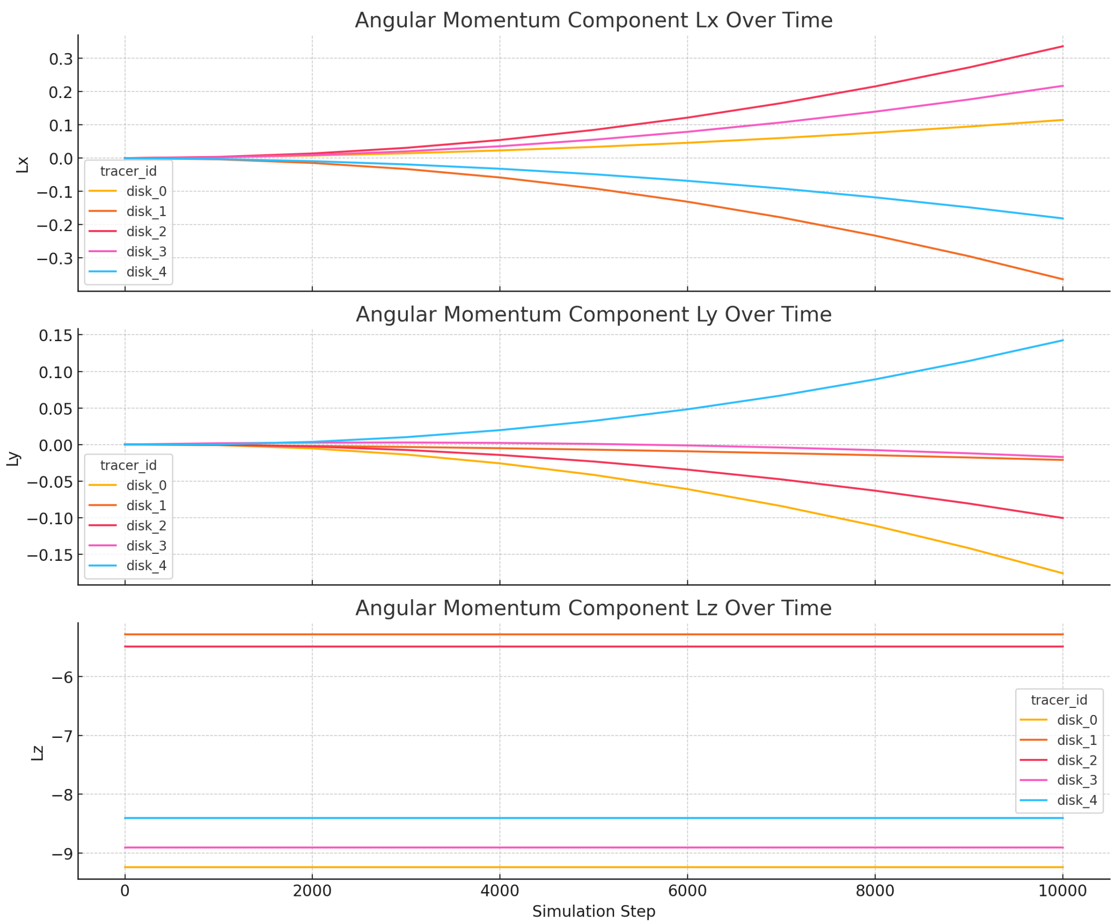

Figure 1: Angular momentum components over time show separation in orbital orientation between disk and perpendicular tracers.

2.2 Orbital Inclination Tracking

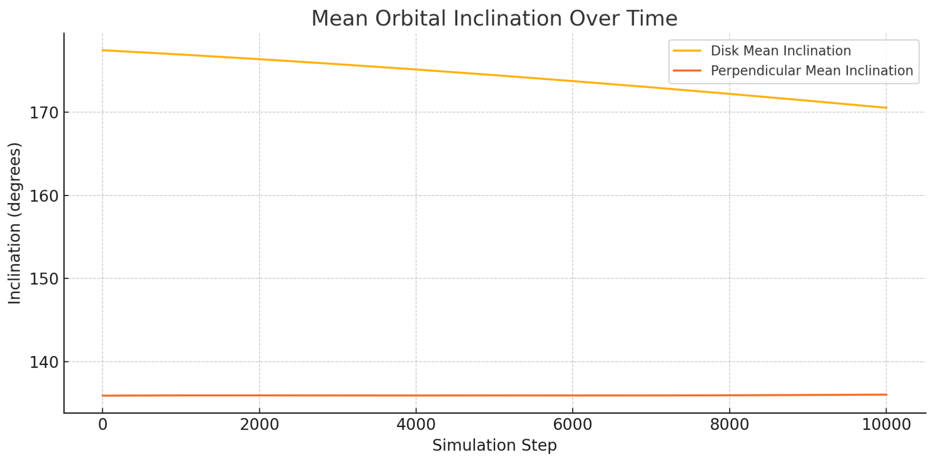

Figure 2: Mean inclination angles remain stable for both disk and perpendicular tracers. Perpendicular tracers maintain orbits at 136° inclination.

2.3 Wake Visualization

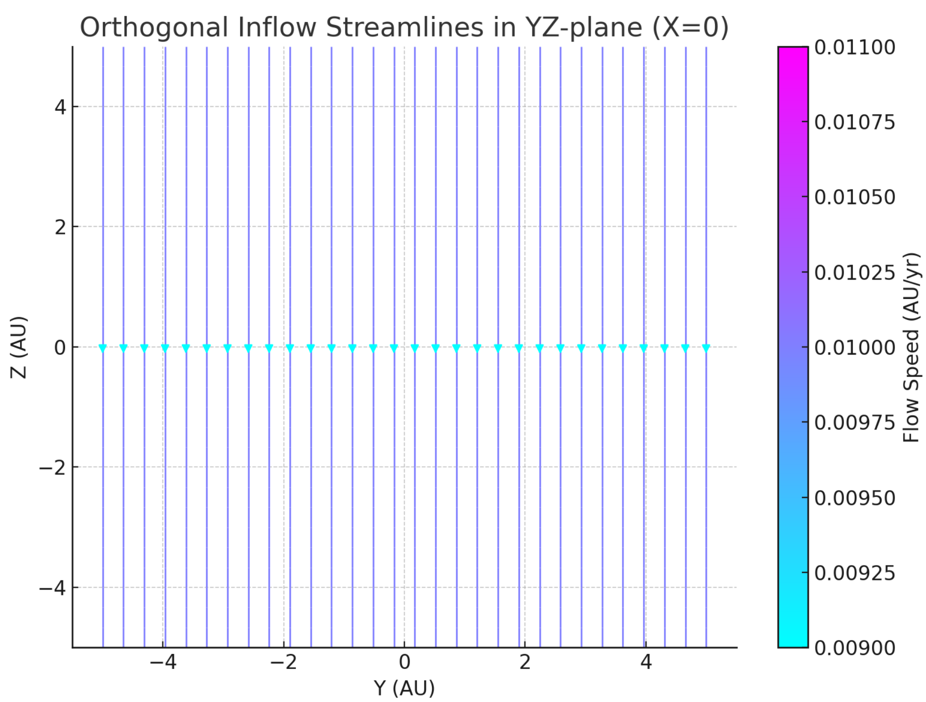

Figure 3: Streamlines in the YZ-plane reveal a structured orthogonal inflow supporting non-coplanar motion.

2.4 Gravitational Entrainment Basin

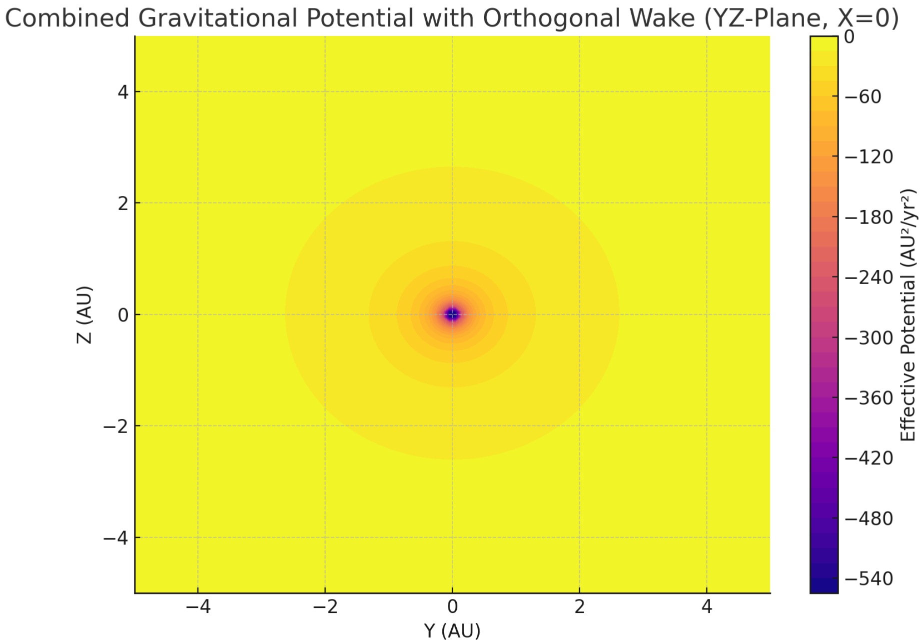

Figure 4: Effective potential shows entrapping gradient aligned with orthogonal wake, forming a tilted well supporting orbital coherence.

3 Conclusion

This test confirms that DWARF's fluid-dynamic framework naturally supports the formation and retention of high-inclination orbits through wake-induced entrapment. This offers an alternative to scattering-based explanations for systems with highly tilted planetary orbits.