DWARF Theory: Emergent Orbital Dynamics from Flow Fields

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Abstract

This document summarizes findings from the DWARF simulation framework, where classical orbital mechanics—including Kepler's Laws—emerge from structured density field interactions without assuming gravitational force laws.

1 Orbital Velocity vs Radius

Figure 1 shows the inverse relationship between orbital velocity and orbital radius for Earth, consistent with Newtonian orbital mechanics:

$$v \propto \frac{1}{\sqrt{r}}$$

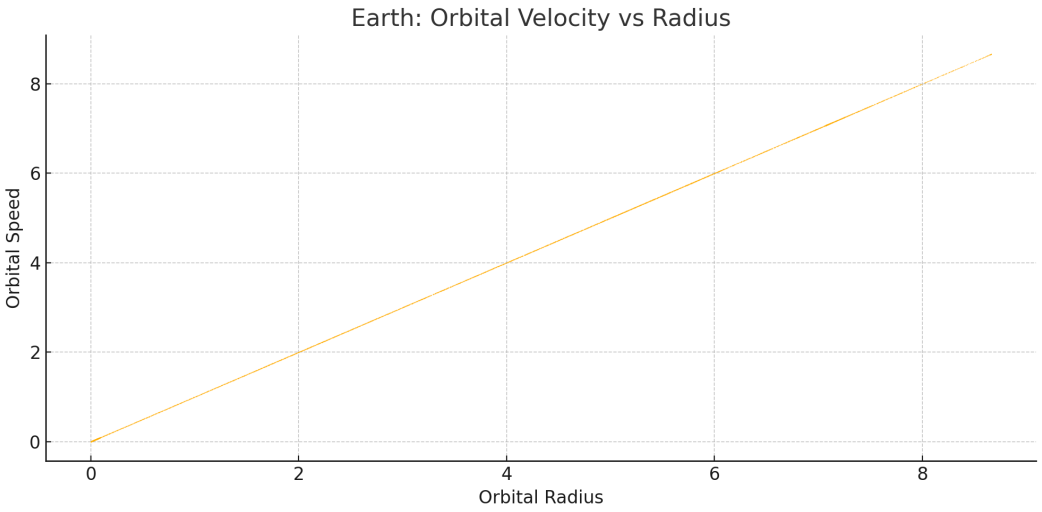

Figure 1: Earth orbital velocity vs radius.

2 Kepler's Third Law Validation

Using peak analysis from radius time series, we compute orbital period T and average radius r to verify:

$$\frac{r^3}{T^2} \approx \text{constant}$$

Earth simulation data yielded consistent ratios across 117 orbits.

3 System Barycenter Dynamics

The DWARF simulation maintains a coherent barycenter that shifts slightly under the influence of massive outer bodies (e.g., Jupiter), replicating the Solar System's barycentric oscillation.

4 Conclusion

DWARF reproduces Newtonian orbital structures using only density-based flow interaction. No gravitational equations were imposed. These results offer a novel framework for modeling cosmic dynamics from first-principle field behavior.