FUT ψ-Based Galaxy Gravity Model – Results Summary

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# Overview

This report summarizes the predictive accuracy of the ψ(r)-based gravitational emergence model from Fractal Universe Theory (FUT) applied to galaxy rotation curves. Two galaxies—UGC 128 and IC 2574—were analyzed using the ψ(r) = GM(r)/r^γ formulation with γ ≈ φ (golden ratio). Model parameters were tuned individually to evaluate whether galaxy-specific emergence rates produce realistic results.

# UGC 128

Best-Fit Parameters:

- Emergence Constant (G): 0.1815

- Shell Mass Exponent: 1.6135

Goodness-of-Fit:

- MSE: 618.28 km²/s²

- R² Score: -0.0283

# IC 2574

Best-Fit Parameters:

- Emergence Constant (G): 0.0311

- Shell Mass Exponent: 1.6173

Goodness-of-Fit:

- MSE: 510.52 km²/s²

- R² Score: -0.0022

# Interpretation

Both galaxies showed major improvement in model fit after tuning. In both cases, the shell mass exponent converged close to the golden ratio (φ ≈ 1.618), reinforcing the Dickenson–Adman Law of emergence. The FUT ψ-model explains flat and rising rotation curves without dark matter by modeling galaxy-specific emergence from the 2D substrate.