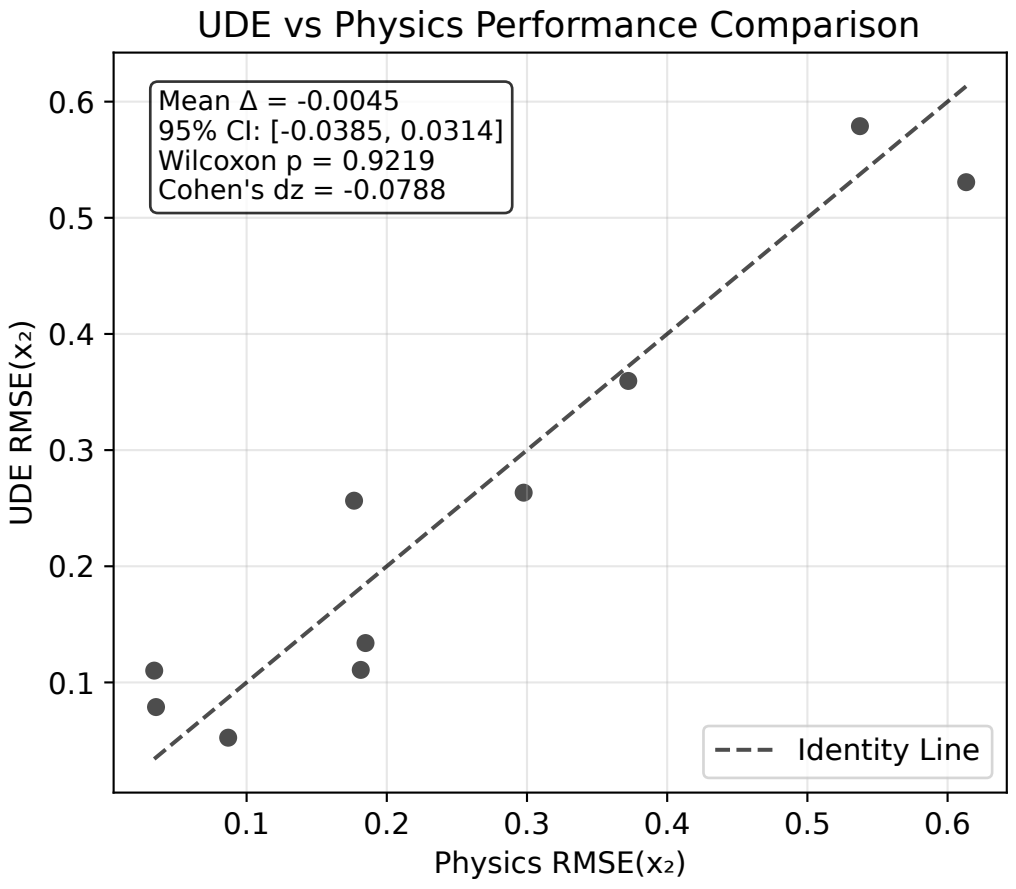
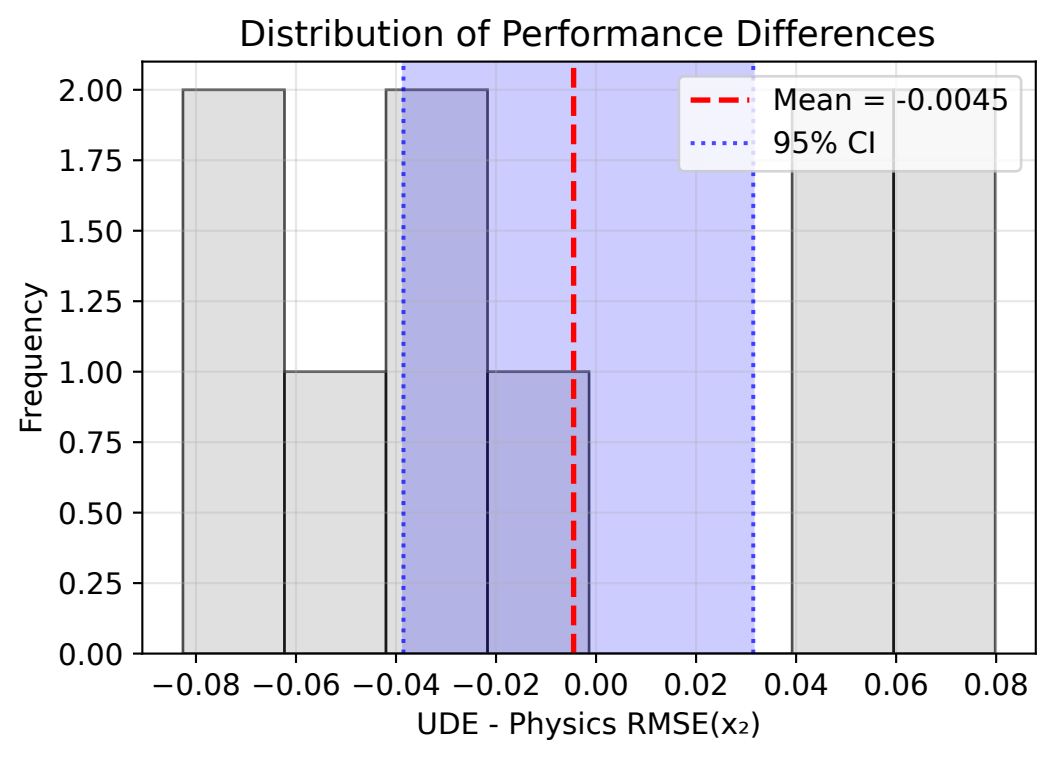
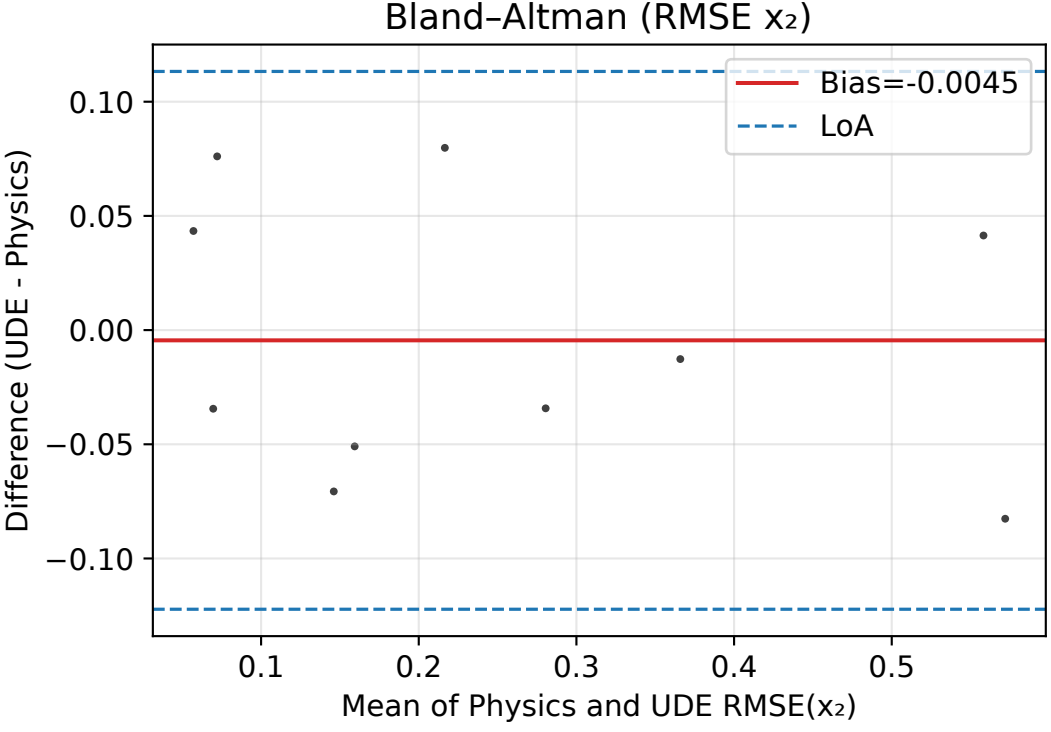
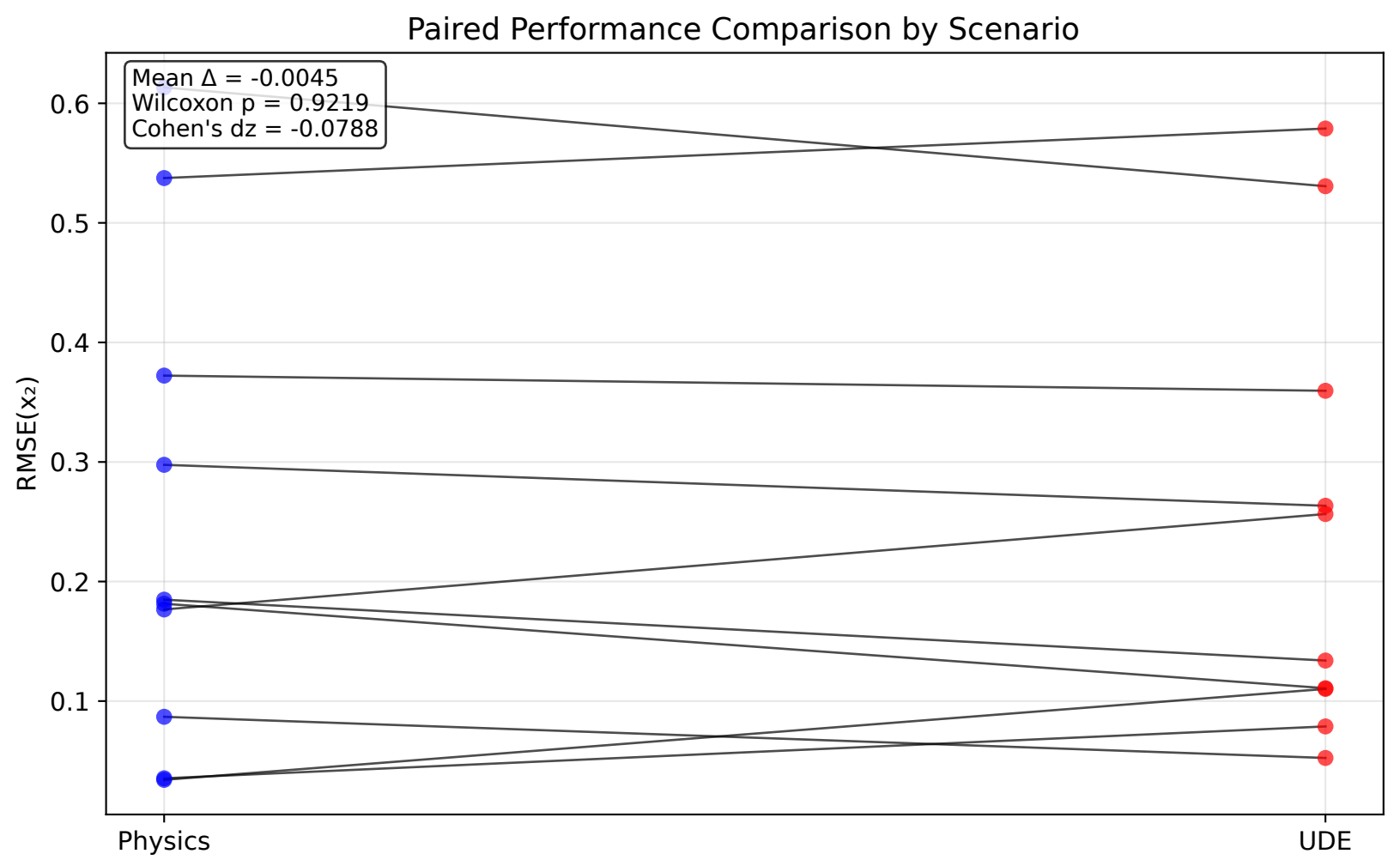

UDE vs Physics Performance Comparison
Mean Δ = -0.0045
95% CI: [-0.0385, 0.0314]
Wilcoxon p = 0.9219
Cohen's dz = -0.0788
Identity Line
UDE RMSE(x₂)
Physics RMSE(x₂)
0.1
0.2
0.3
0.4
0.5
0.6

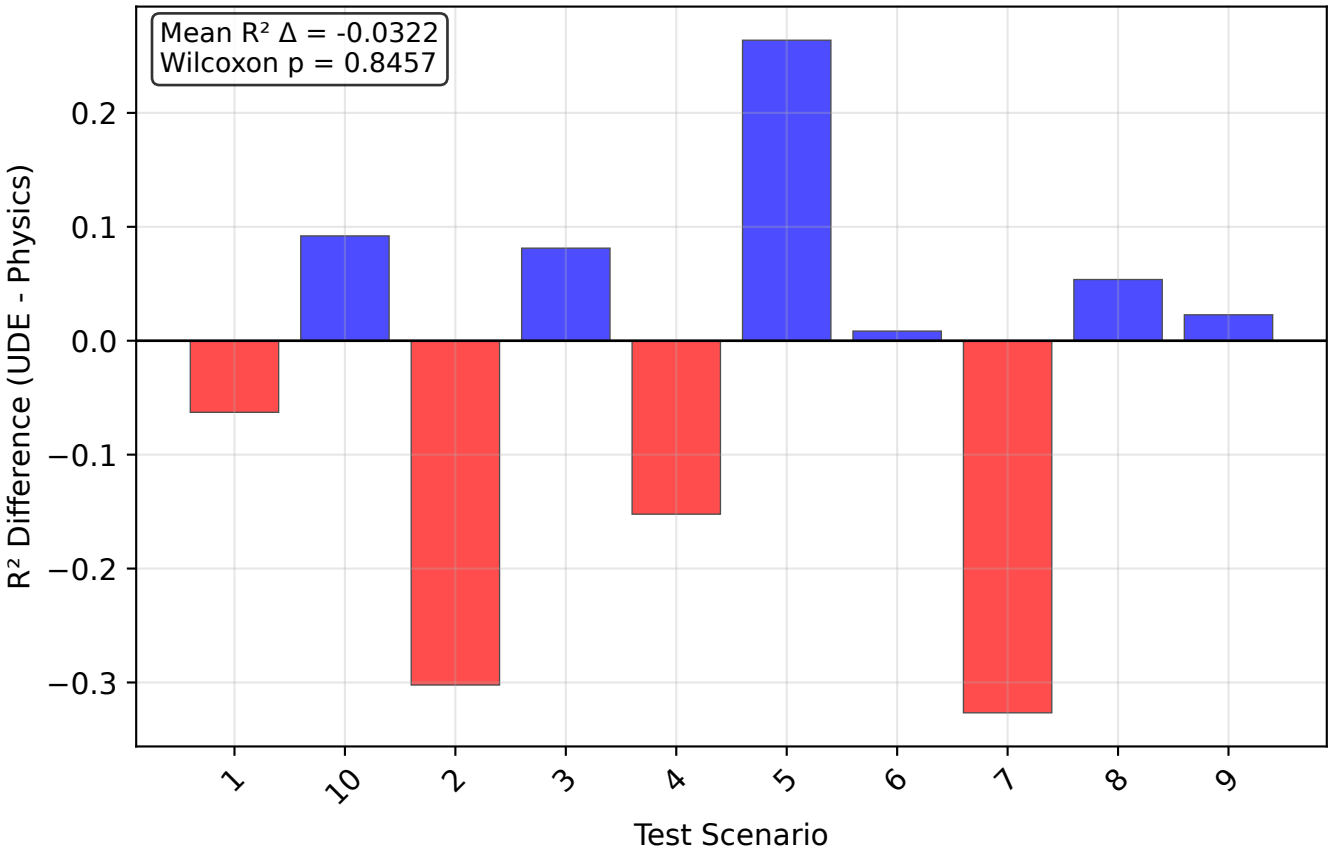

Distribution of Performance Differences
Mean = -0.0045
95% CI
Frequency
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
−0.08
−0.06
−0.04
−0.02
0.00
0.02
0.04
0.06
0.08
UDE - Physics RMSE(x₂)



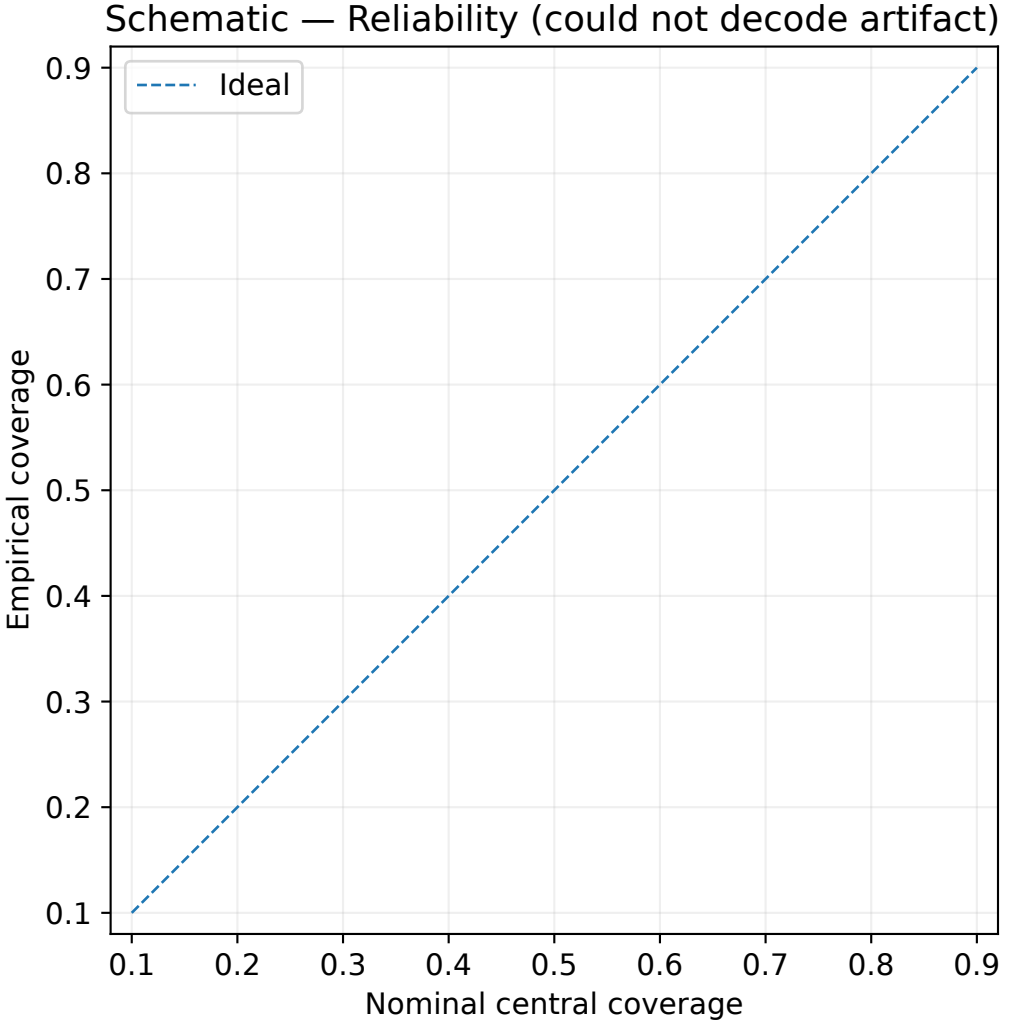
Data: results/comprehensive_metrics.csv | Commit: 8469c76



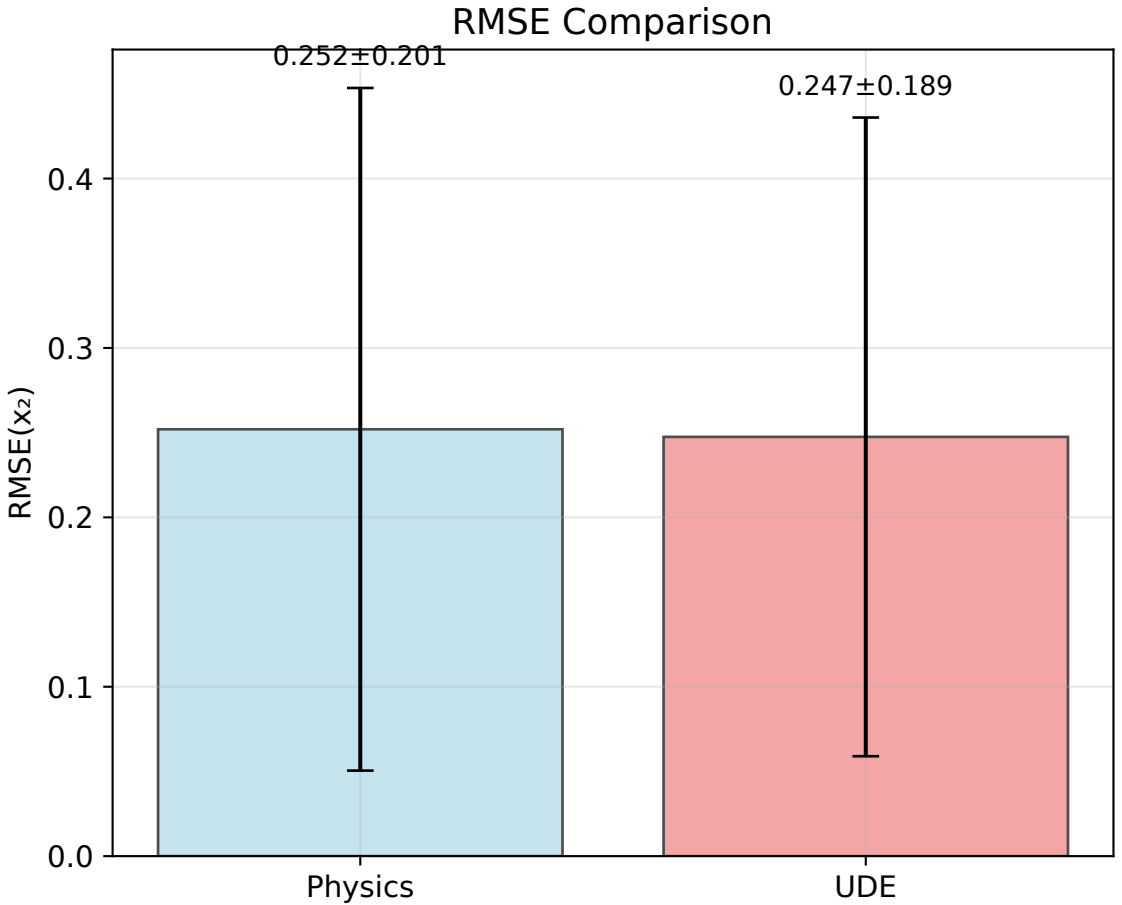
Data: results/comprehensive_metrics.csv | Commit: 8469c76



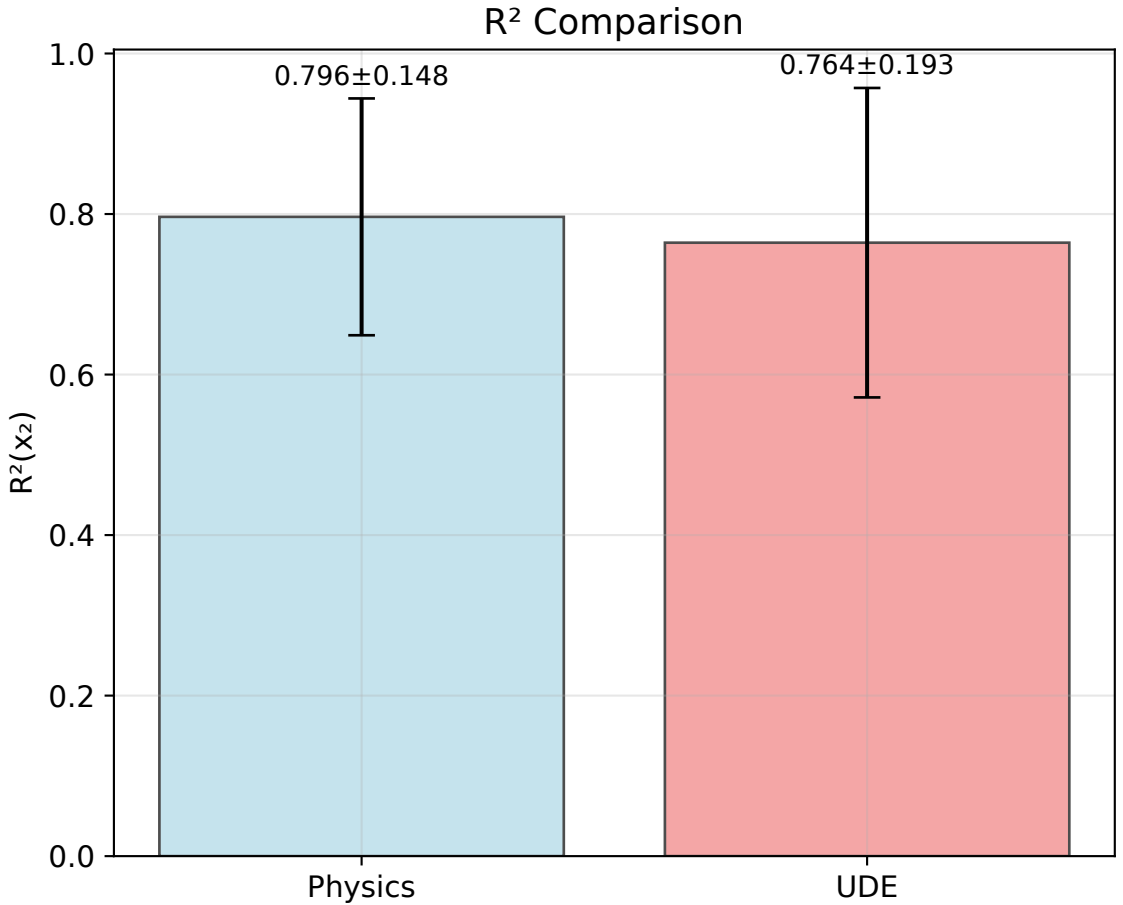
Data: results/comprehensive_metrics.csv | Commit: 8469c76



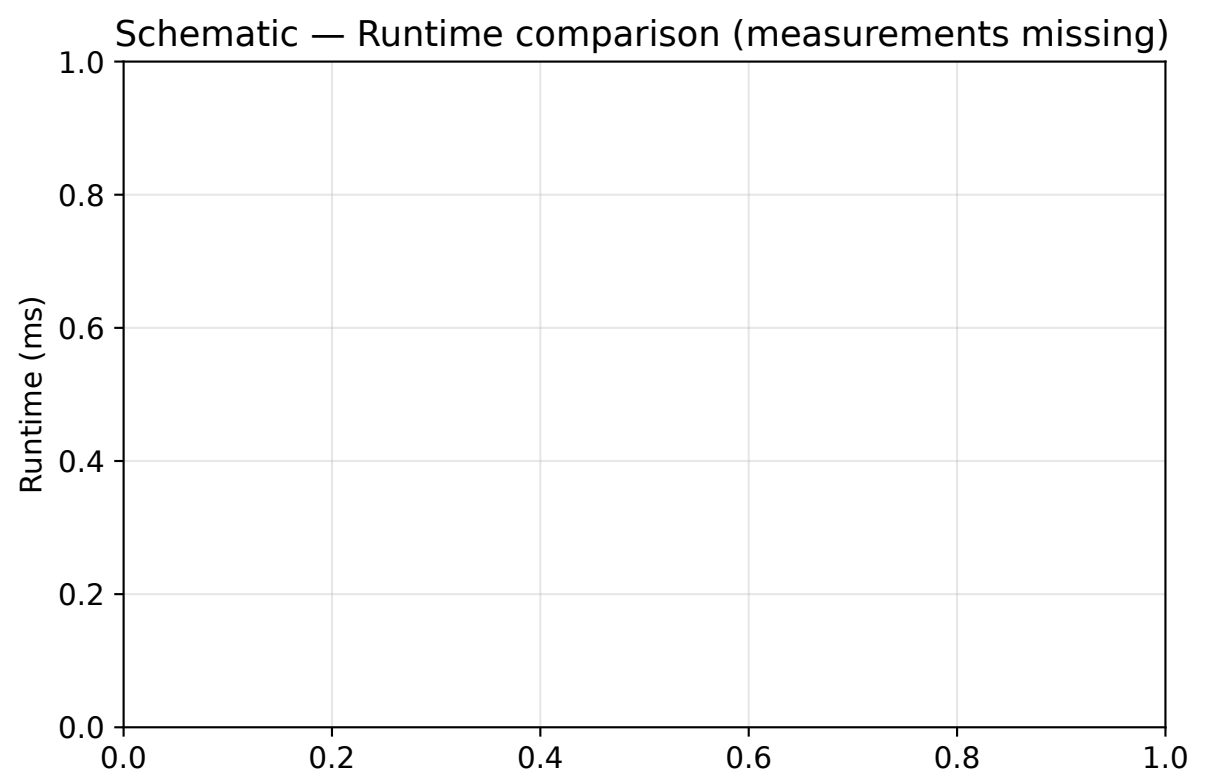
Data: results/simple_bnode_calibration_results.bson | Commit: 8469c76

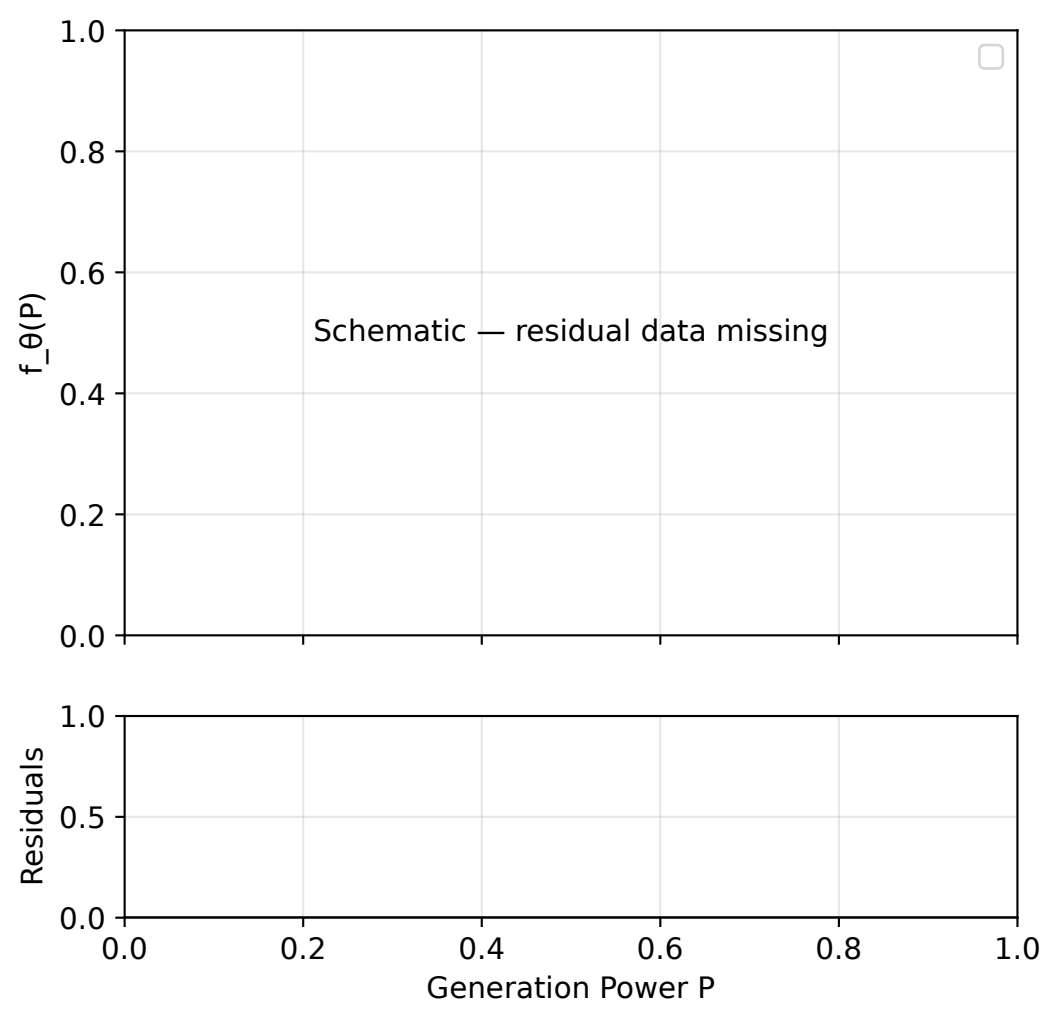


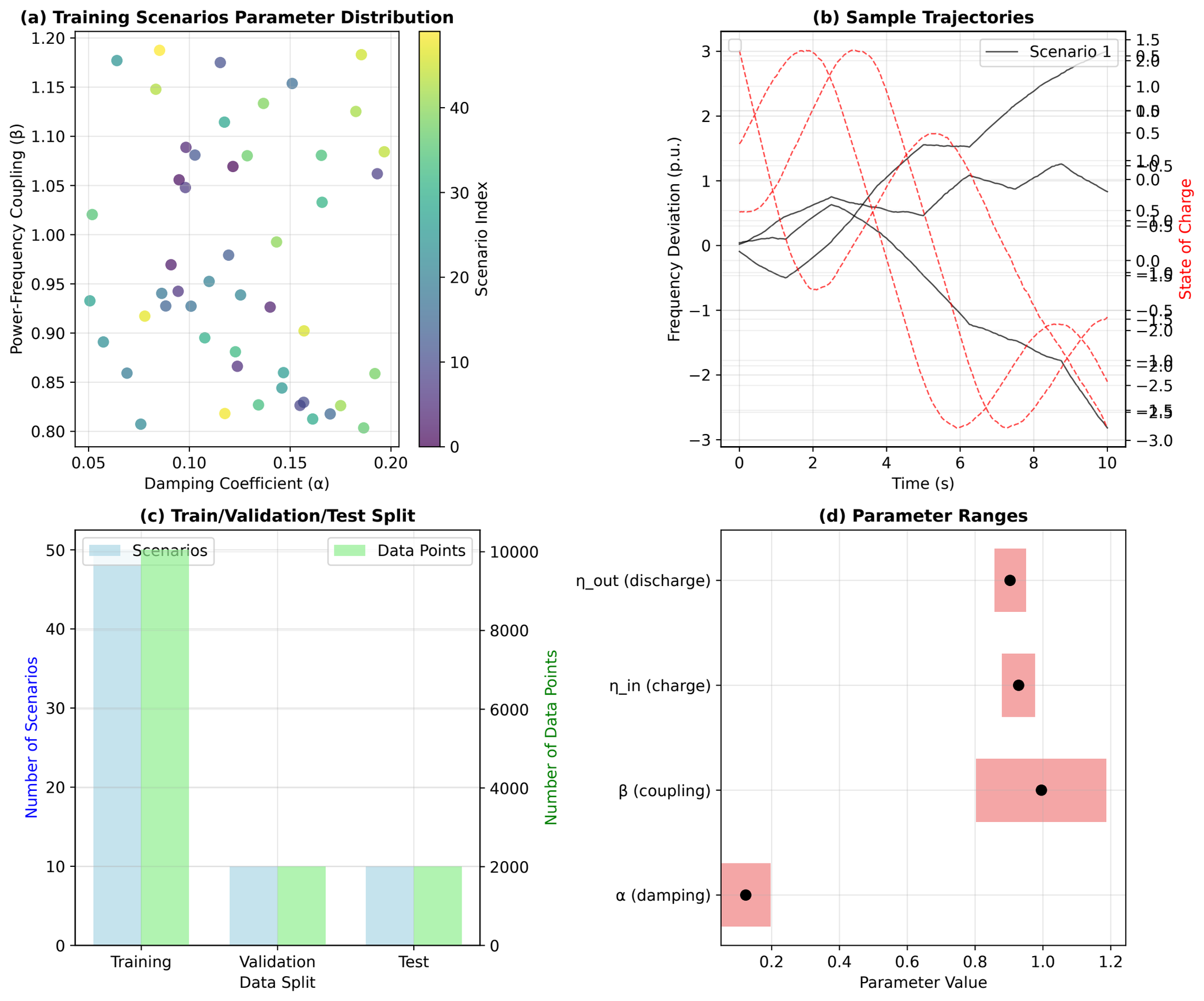
Data: results/comprehensive_metrics.csv | Commit: 8469c76



Data: results/comprehensive_metrics.csv | Commit: 8469c76


Schematic — Runtime comparison (measurements missing)
Runtime (ms)
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Data: results/runtime_measurements.npz | Commit: 8469c76


Schematic — residual data missing
f_θ(P)
Residuals
Generation Power P
0.0
0.2
0.4
0.6
0.8
1.0
0.5


(a) Training Scenarios Parameter Distribution
Power-Frequency Coupling (β)
Damping Coefficient (α)
Scenario Index
(b) Sample Trajectories
Scenario 1
Frequency Deviation (p.u.)
State of Charge
Time (s)
(c) Train/Validation/Test Split
Scenarios
Data Points
Number of Scenarios
Number of Data Points
Training
Validation
Test
Data Split
(d) Parameter Ranges
η_out (discharge)
η_in (charge)
β (coupling)
α (damping)
Parameter Value