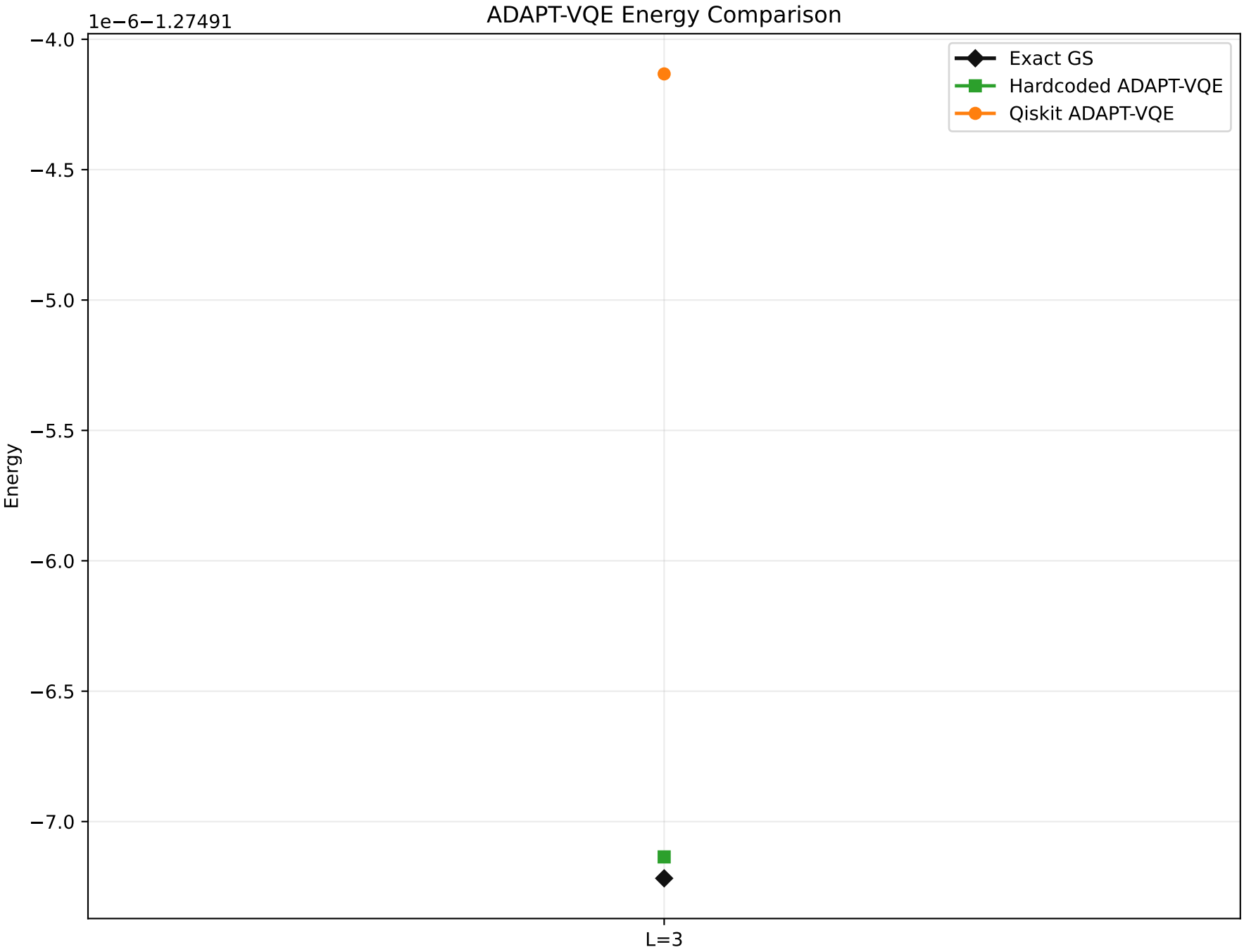
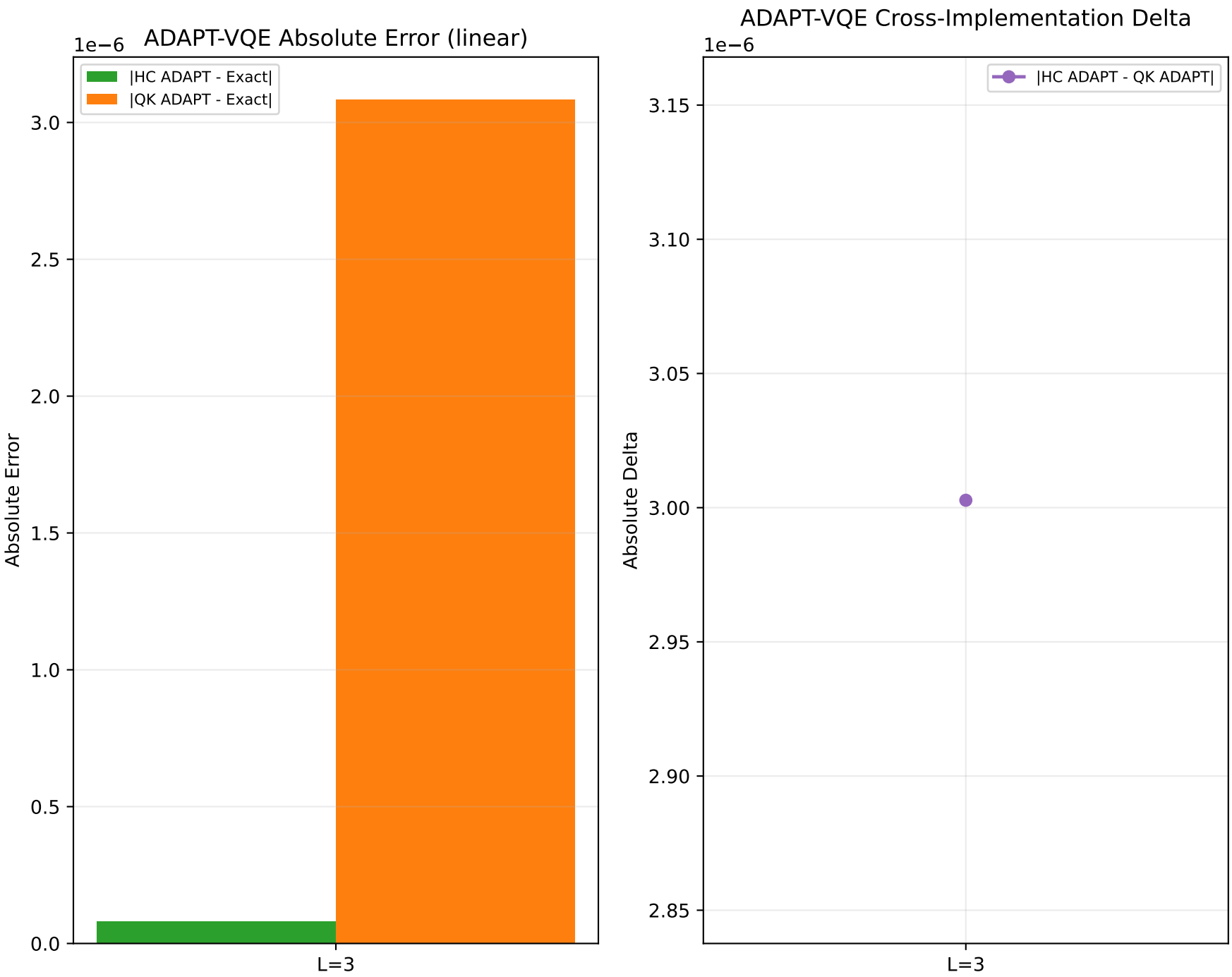
Executed Command

Script: pipelines/compare_adapt_pipelines.py

```
/opt/anaconda3/bin/python3 pipelines/compare_adapt_pipelines.py --l-values 3 --run-pipelines --hc-adapt-max-
    depth 50 --hc-adapt-eps-grad 1e-6 --hc-adapt-eps-energy 1e-10 --hc-adapt-maxiter 1000 --qk-adapt-max-
    iterations 50 --qk-adapt-gradient-threshold 1e-6 --qk-adapt-cobyla-maxiter 1000
```

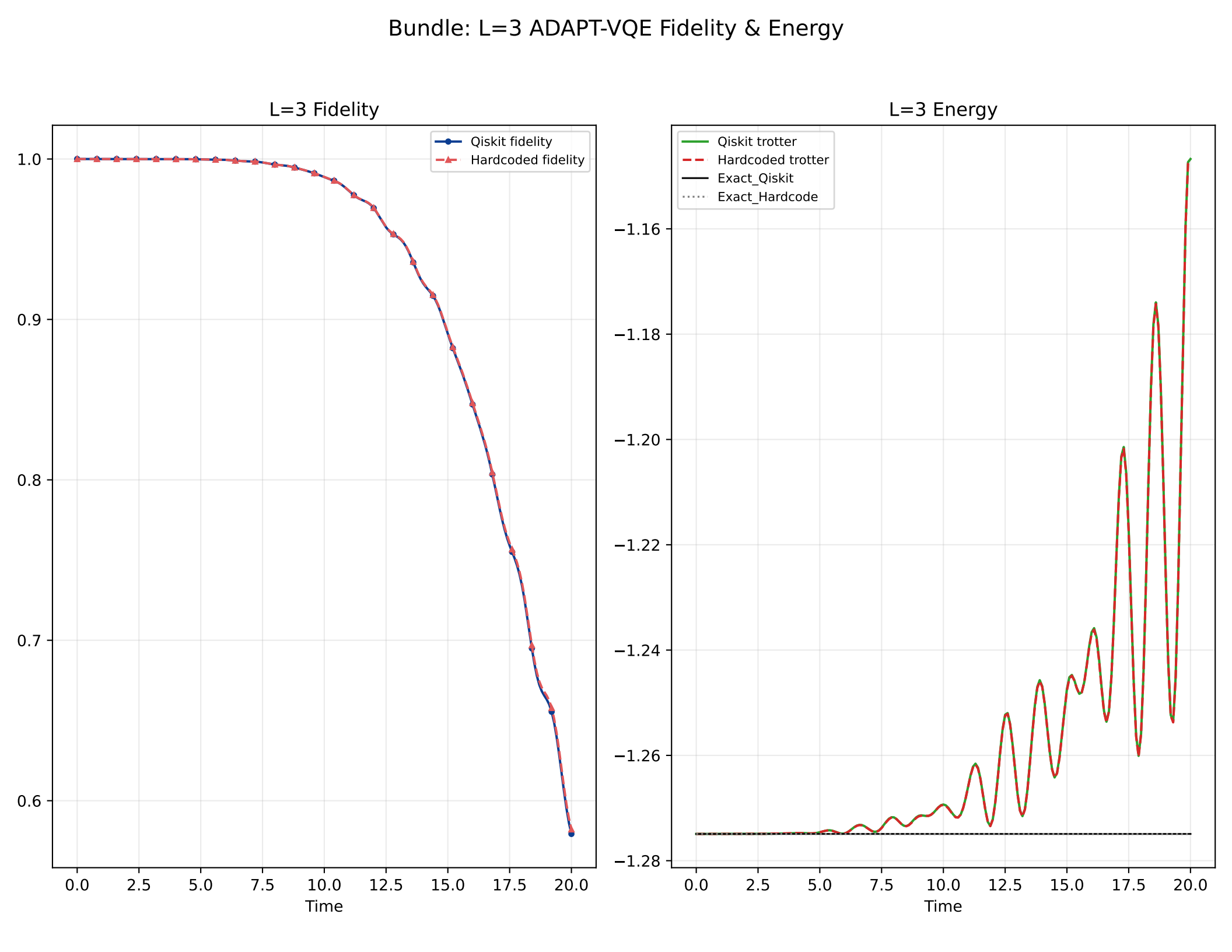
```
Hardcoded ADAPT-VQE vs Qiskit ADAPT-VQE Comparison Summary

generated_utc: 2026-02-25T03:59:34.286724+00:00
all_pass: False
l_values: [3]

trajectory_comparison_basis: trotter trajectories start from
  each pipeline's ADAPT-VQE ground state (default: adapt_vqe)
exact_trajectory_labels: Exact_Hardcode, Exact_Qiskit
exact_trajectory_method: python_matrix_eigendecomposition

thresholds:
{'doublon_trotter_max_abs_delta': 0.001,
 'energy_trotter_max_abs_delta': 0.001,
 'fidelity_max_abs_delta': 0.0001,
 'ground_state_energy_abs_delta': 1e-08,
 'n_dn_site0_trotter_max_abs_delta': 0.005,
 'n_up_site0_trotter_max_abs_delta': 0.005}

Delta metric definitions:
ΔF(t)      = |F_hc(t) - F_qk(t)|
ΔE_trot(t) = |E_trot_hc(t) - E_trot_qk(t)|
Δn_up0(t)  = |n_up0_hc(t) - n_up0_qk(t)|
Δn_dn0(t)  = |n_dn0_hc(t) - n_dn0_qk(t)|
ΔD(t)      = |D_hc(t) - D_qk(t)|
F_pipeline(t) is the pipeline's stored trajectory fidelity value (as computed internally vs that pipeline's exact
    evolution).

Per-L pass flags:
L=3 pass=False metrics_json=/Users/jakestrobel/Downloads/Holstein_test/Adapt-VQE-
    Pipeline/artifacts/hardcoded_vs_qiskit_adapt_L3_metrics.json
```

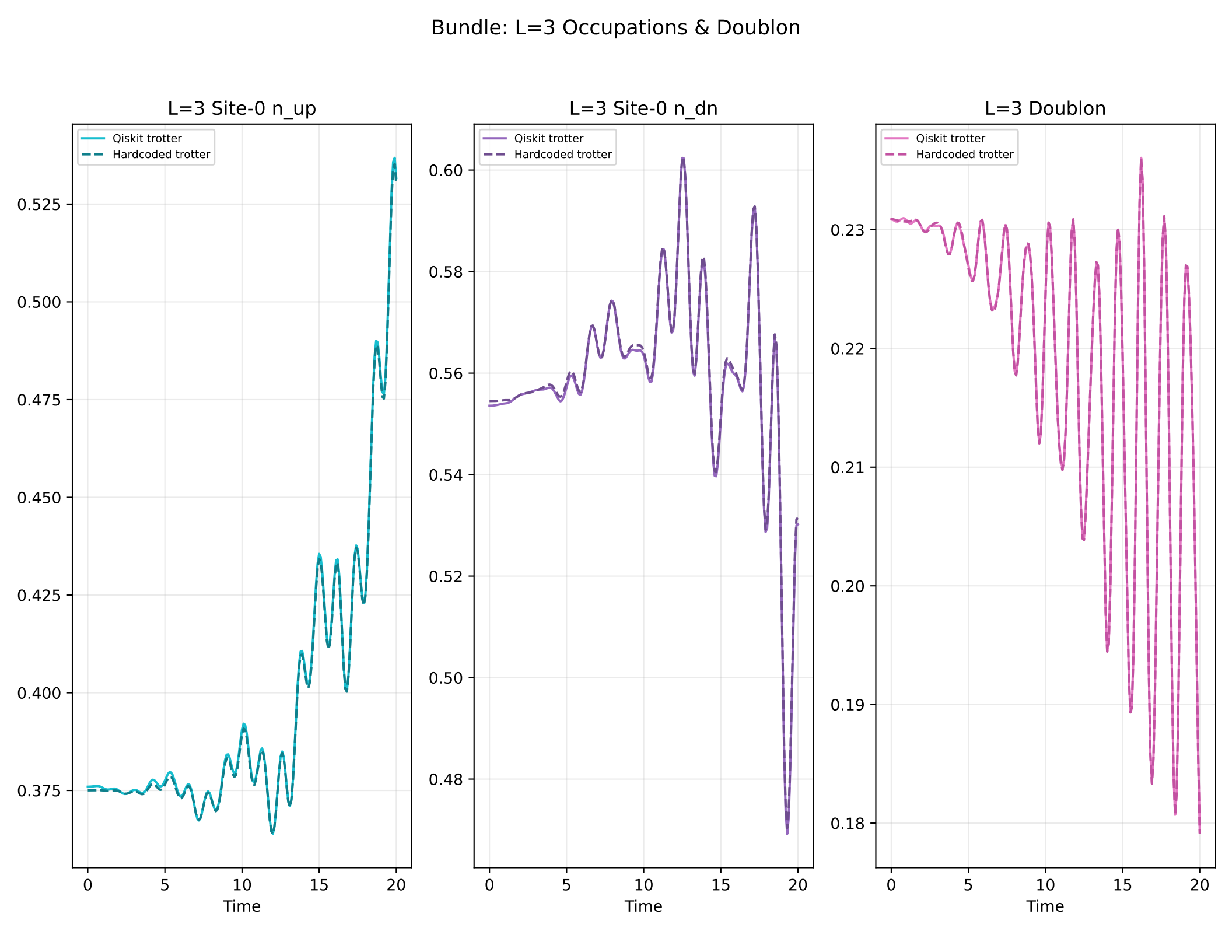

ADAPT-VQE Energy Comparison
1e−6−1.27491
−4.0
−4.5
−5.0
−5.5
−6.0
−6.5
−7.0
Energy
L=3
Exact GS
Hardcoded ADAPT-VQE
Qiskit ADAPT-VQE

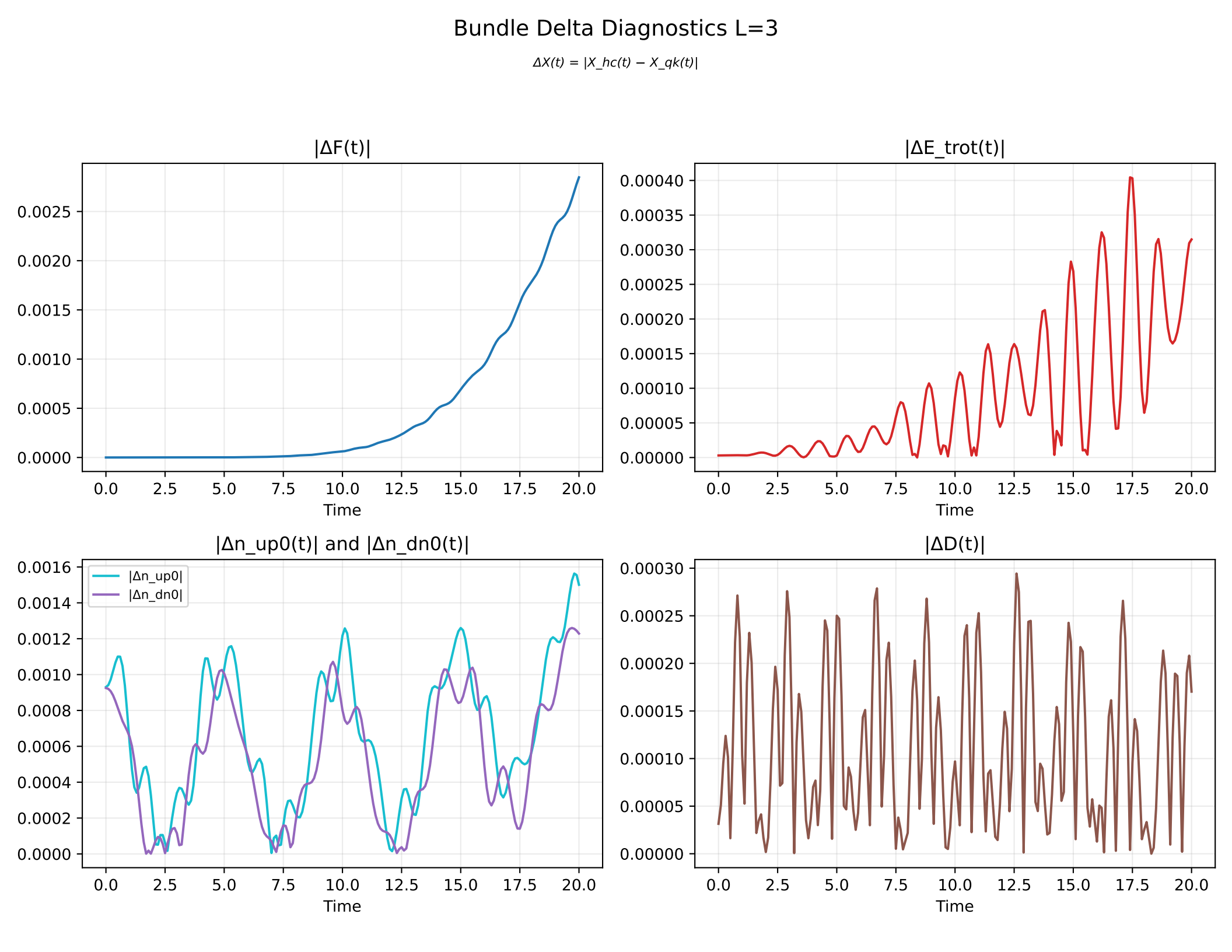

ADAPT-VQE Absolute Error (linear)
1e−6
|HC ADAPT - Exact|
|QK ADAPT - Exact|
Absolute Error
3.0
2.5
2.0
1.5
1.0
0.5
0.0
L=3
ADAPT-VQE Cross-Implementation Delta
1e−6
|HC ADAPT - QK ADAPT|
Absolute Delta
3.15
3.10
3.05
3.00
2.95
2.90
2.85
L=3

Bundle L=3: ADAPT-VQE Settings & Metrics

```
L=3  t=1.0  u=4.0  dv=0.0  boundary=periodic  ordering=blocked  initial_state_source=adapt_vqe  t_final=20.0  num_times=201

thresholds:
  doublon_trotter_max_abs_delta: 1.00e-03
  energy_trotter_max_abs_delta: 1.00e-03
  fidelity_max_abs_delta: 1.00e-04
  ground_state_energy_abs_delta: 1.00e-08
  n_dn_site0_trotter_max_abs_delta: 5.00e-03
  n_up_site0_trotter_max_abs_delta: 5.00e-03

max |Δ|:
  gs_energy: 0.00e+00
  doublon_trotter: 2.94e-04
  energy_trotter: 4.04e-04
  fidelity: 2.85e-03
  n_dn_site0_trotter: 1.26e-03
  n_up_site0_trotter: 1.56e-03
result: FAIL
```


Bundle: L=3 ADAPT-VQE Fidelity & Energy
L=3 Fidelity
Qiskit fidelity
Hardcoded fidelity
1.0
0.9
0.8
0.7
0.6
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Time
L=3 Energy
Qiskit trotter
Hardcoded trotter
Exact_Qiskit
Exact_Hardcode
−1.16
−1.18
−1.20
−1.22
−1.24
−1.26
−1.28
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Time


Bundle: L=3 Occupations & Doublon
L=3 Site-0 n_up
L=3 Site-0 n_dn
L=3 Doublon
Qiskit trotter
Hardcoded trotter
Time
0
5
10
15
20
0.525
0.500
0.475
0.450
0.425
0.400
0.375
0.60
0.58
0.56
0.54
0.52
0.50
0.48
0.23
0.22
0.21
0.20
0.19
0.18


Bundle Delta Diagnostics L=3
ΔX(t) = |X_hc(t) − X_qk(t)|
|ΔF(t)|
|ΔE_trot(t)|
|Δn_up0(t)| and |Δn_dn0(t)|
|ΔD(t)|
|Δn_up0|
|Δn_dn0|
Time

Bundle metrics page L=3

ground_state_energy_abs_delta = 0.0
fidelity max/mean/final = 0.0028472181418830456 / 0.0004863150217258033 / 0.0028472181418830456
energy_trotter max/mean/final = 0.00040448998847808504 / 8.782021618988957e-05 / 0.00031480678318551725
n_up_site0_trotter max/mean/final = 0.001563395558948688 / 0.0006754864255162744 / 0.0015008393939485165
n_dn_site0_trotter max/mean/final = 0.0012600920797239956 / 0.0005352107584712608 / 0.0012287359904210593
doublon_trotter max/mean/final = 0.00029437047651986736 / 0.00011316375758190726 / 0.00017030616756291694

checks:
{'doublon_trotter_max_abs_delta': True,
 'energy_trotter_max_abs_delta': True,
 'fidelity_max_abs_delta': False,
 'ground_state_energy_abs_delta': True,
 'n_dn_site0_trotter_max_abs_delta': True,
 'n_up_site0_trotter_max_abs_delta': True}

PASS = False