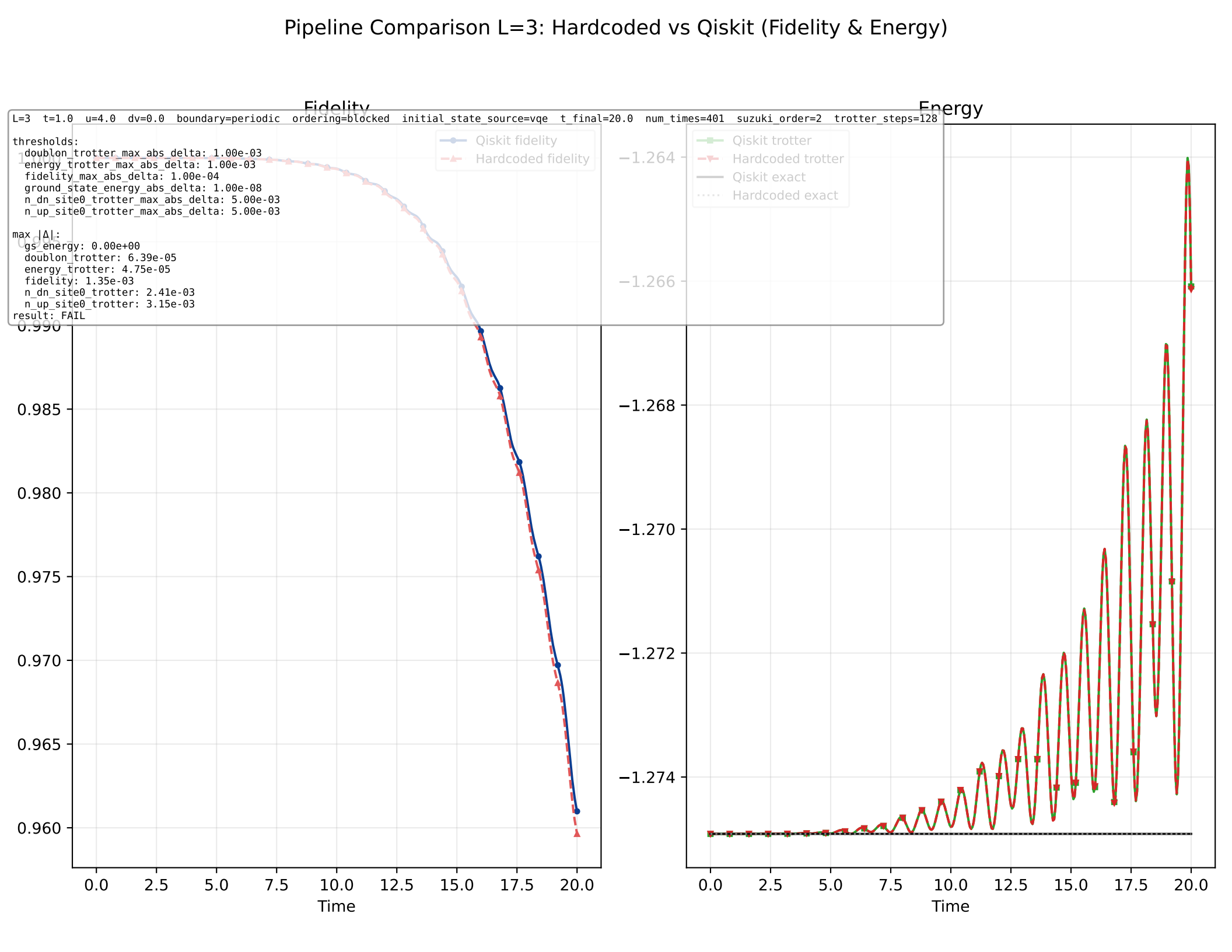
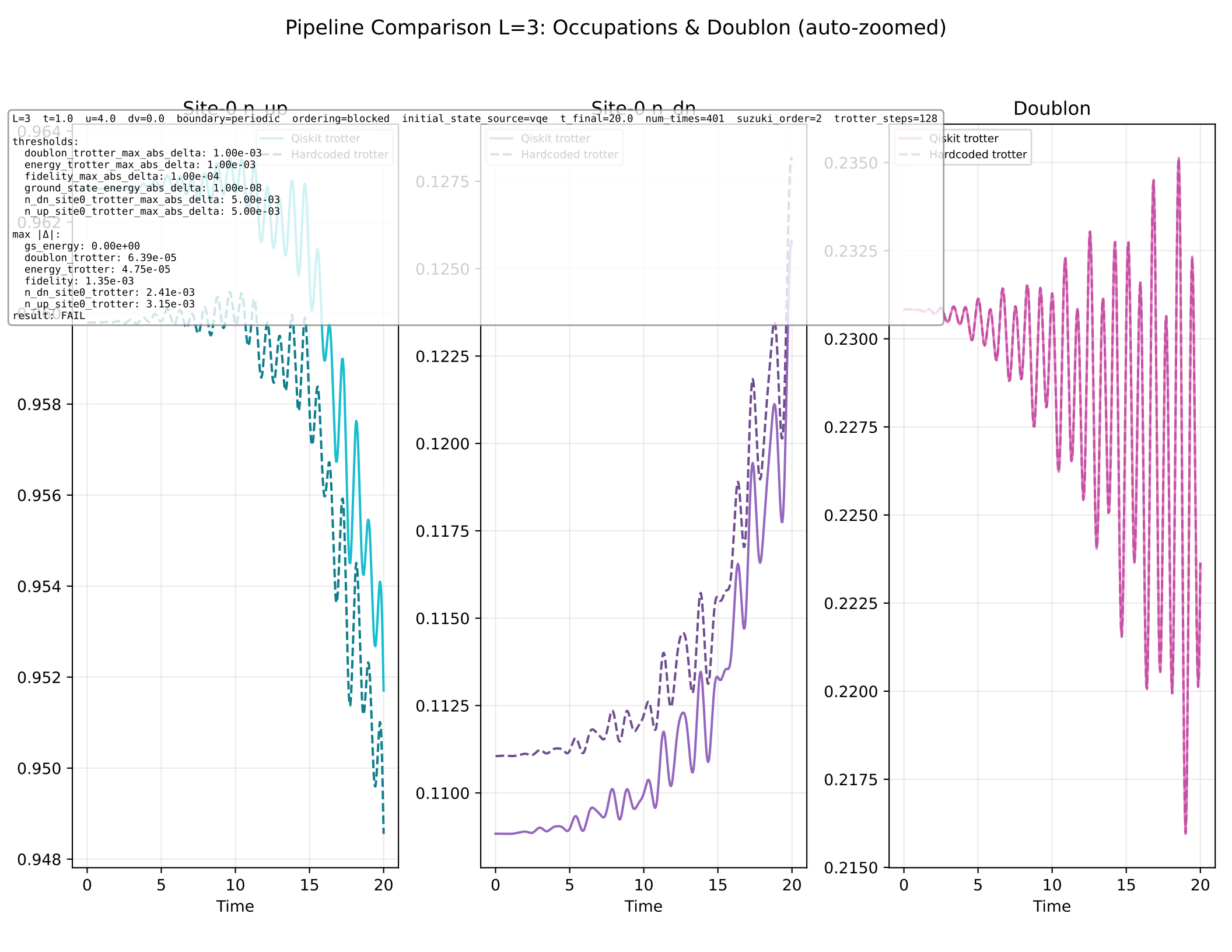
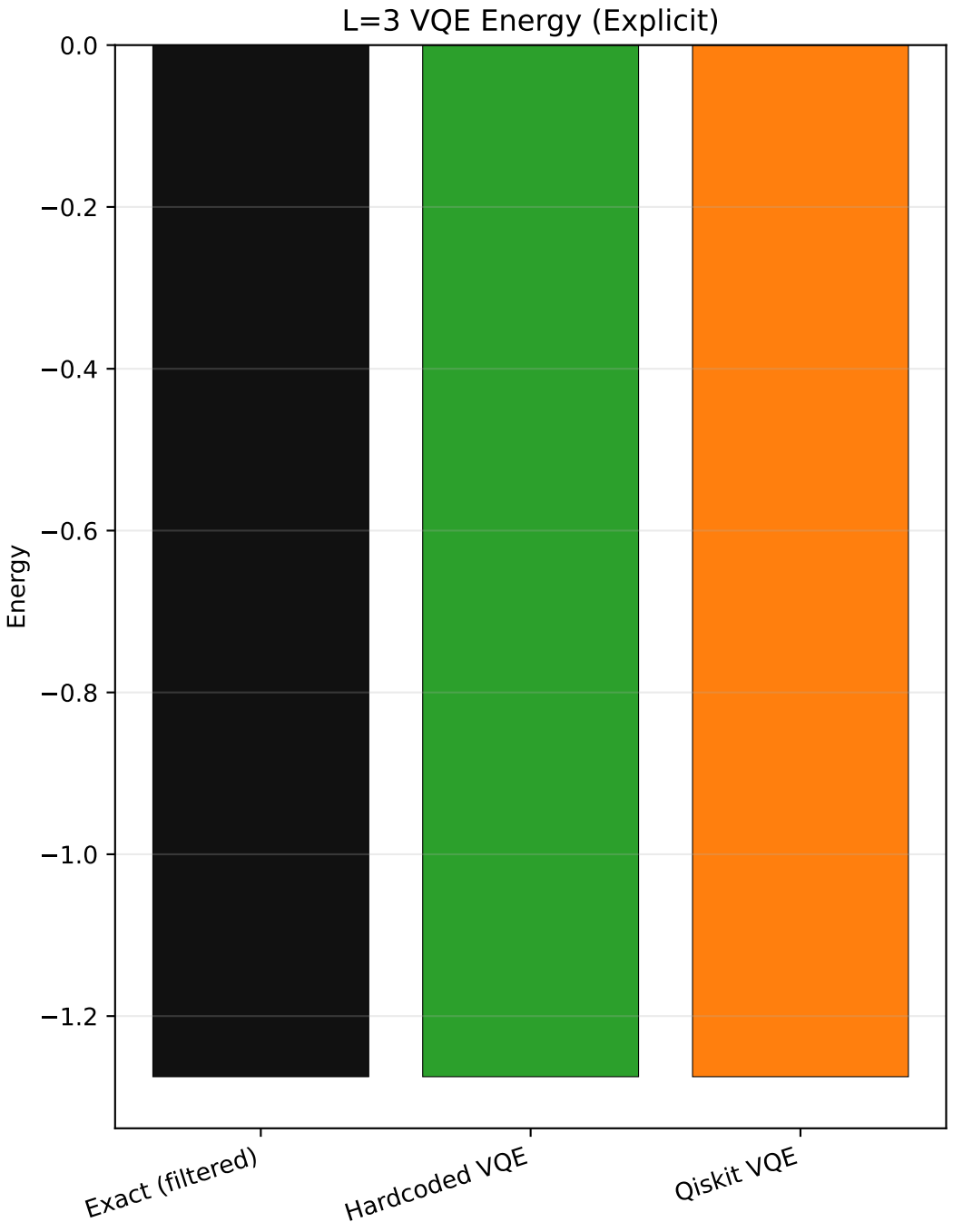
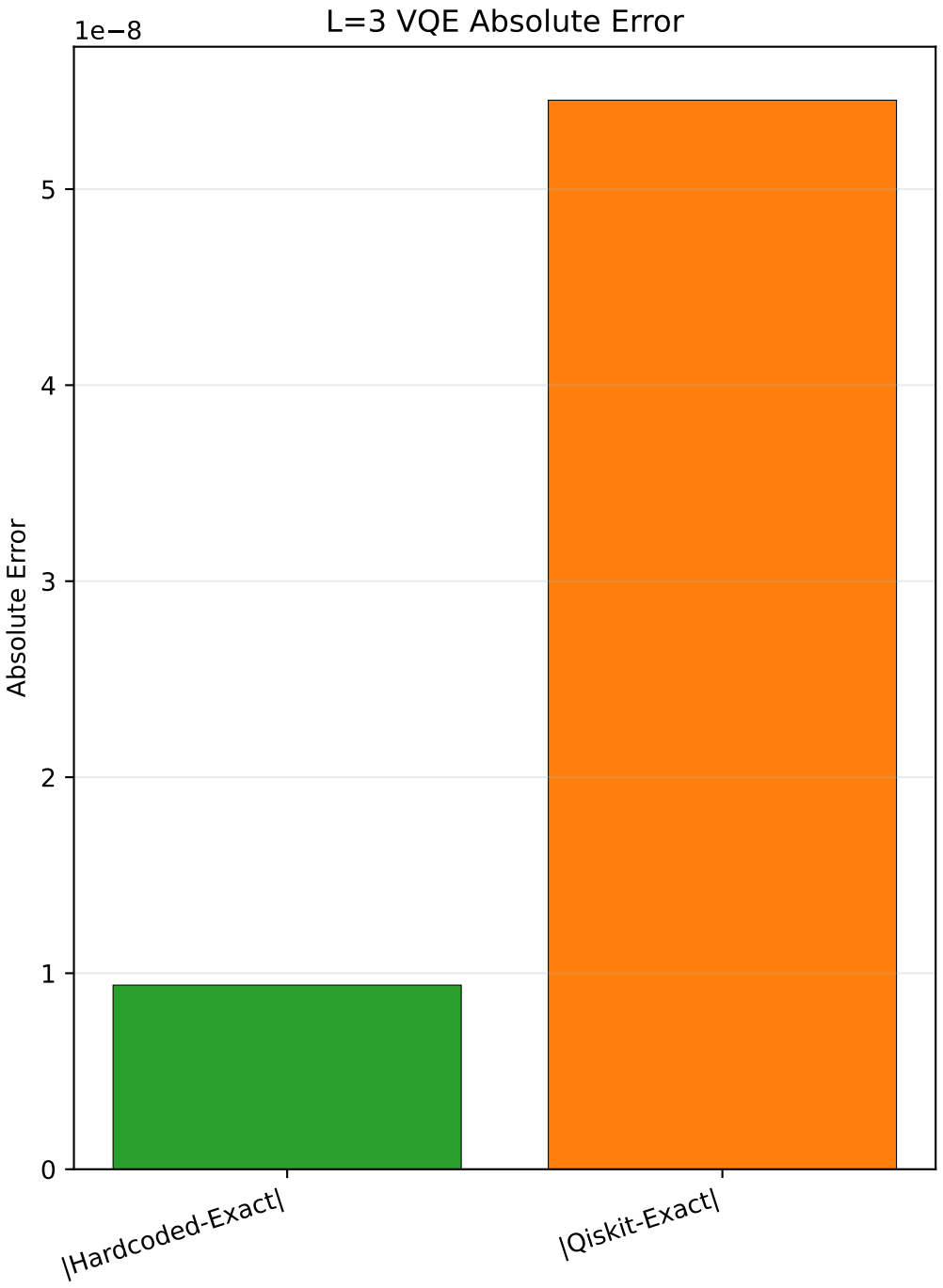

Pipeline Comparison L=3: Hardcoded vs Qiskit (Fidelity & Energy)
L=3 t=1.0 u=4.0 dv=0.0 boundary=periodic ordering=blocked initial_state_source=vqe t_final=20.0 num_times=401 suzuki_order=2 trotter_steps=128
thresholds:
doublon_trotter_max_abs_delta: 1.00e-03
energy_trotter_max_abs_delta: 1.00e-03
fidelity_max_abs_delta: 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: 6.39e-05
energy_trotter: 4.75e-05
fidelity: 1.35e-03
n_dn_site0_trotter: 2.41e-03
n_up_site0_trotter: 3.15e-03
result: FAIL
Fidelity
Qiskit fidelity
Hardcoded fidelity
0.990
0.985
0.980
0.975
0.970
0.965
0.960
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Time
Energy
Qiskit trotter
Hardcoded trotter
Qiskit exact
Hardcoded exact
−1.264
−1.266
−1.268
−1.270
−1.272
−1.274
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Time


Pipeline Comparison L=3: Occupations & Doublon (auto-zoomed)
L=3 t=1.0 u=4.0 dv=0.0 boundary=periodic ordering=blocked initial_state_source=vqe t_final=20.0 num_times=401 suzuki_order=2 trotter_steps=128
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: 6.39e-05
energy_trotter: 4.75e-05
fidelity: 1.35e-03
n_dn_site0_trotter: 2.41e-03
n_up_site0_trotter: 3.15e-03
result: FAIL
Site 0 n_up
Site 0 n_dn
Doublon
Qiskit trotter
Hardcoded trotter
Time

VQE is a separate quantity from the Trotter t=0 value; do not infer VQE energy from trajectory plots.





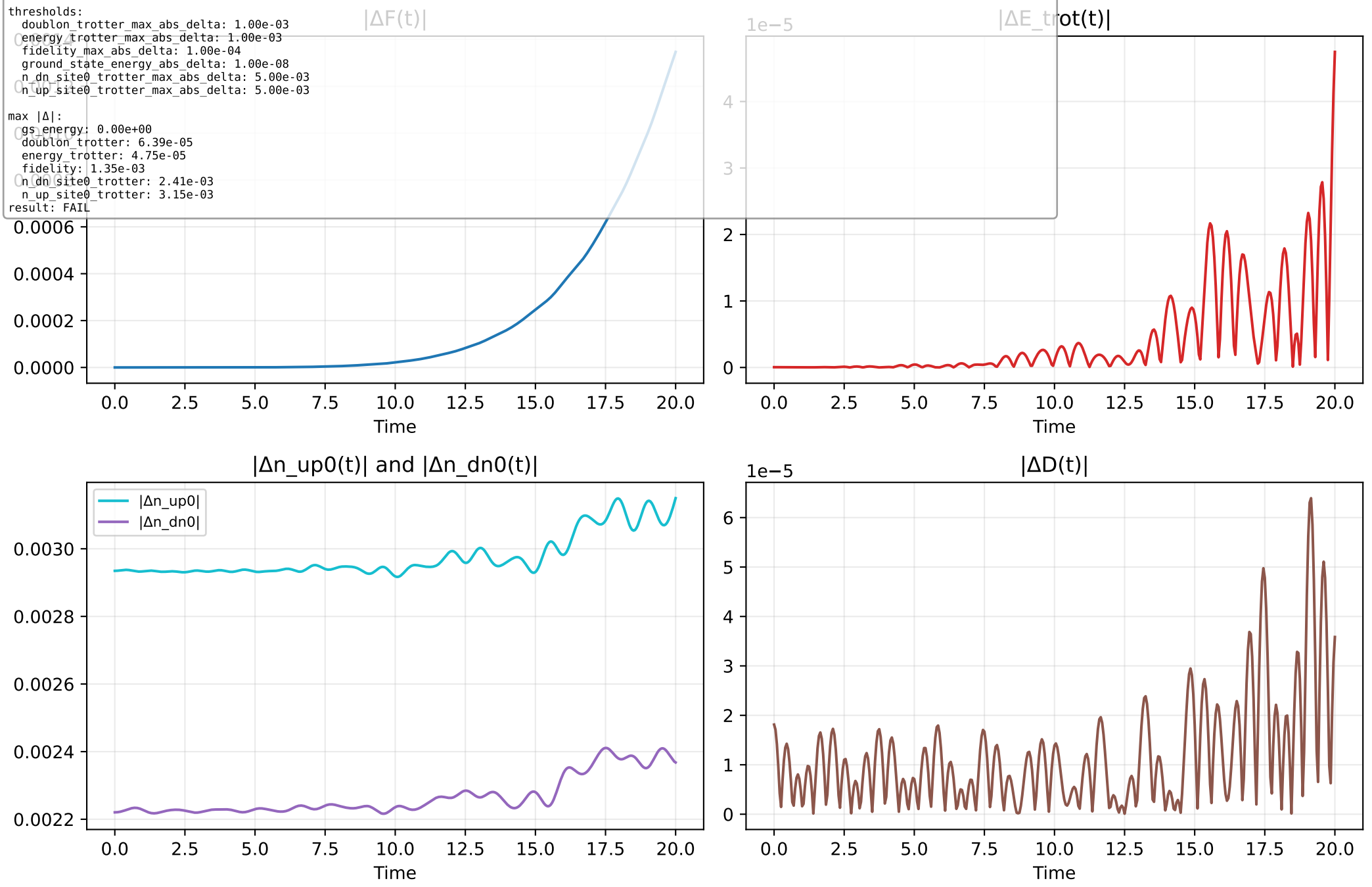
Delta Diagnostics L=3

ΔX(t) = |X_hc(t) − X_qk(t)|, where X_pipeline(t) is that pipeline's stored trajectory value.

```
L=3  t=1.0  u=4.0  dv=0.0  boundary=periodic  ordering=blocked  initial_state_source=vqe  t_final=20.0  num_times=401  suzuki_order=2  trotter_steps=128

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: 6.39e-05
  energy_trotter: 4.75e-05
  fidelity: 1.35e-03
  n_dn_site0_trotter: 2.41e-03
  n_up_site0_trotter: 3.15e-03
result: FAIL
```



```
L=3 metrics summary

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).

ground_state_energy_abs_delta = 0.0
fidelity max/mean/final = 0.0013464071626839713 / 0.00019665025721909328 / 0.0013464071626839713
energy_trotter max/mean/final = 4.7458908048580994e-05 / 3.99668035453194e-06 / 4.7458908048580994e-05
n_up_site0_trotter max/mean/final = 0.0031496651890847716 / 0.002975898354829075 / 0.0031496651890847716
n_dn_site0_trotter max/mean/final = 0.0024109550934178353 / 0.00226718670337712 / 0.002368035185029038
doublon_trotter max/mean/final = 6.39293585977807e-05 / 1.1616930205037722e-05 / 3.5848731140875056e-05

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
```