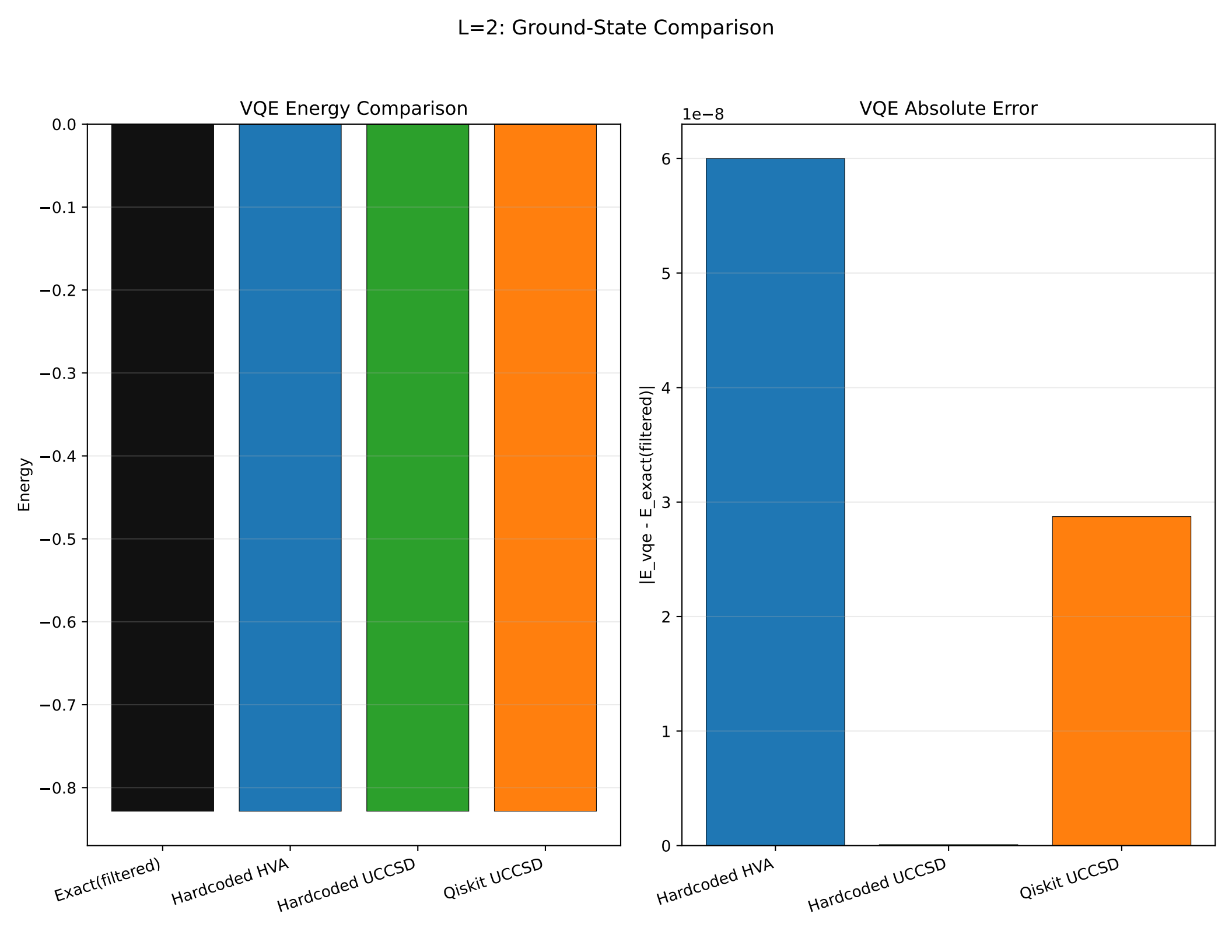
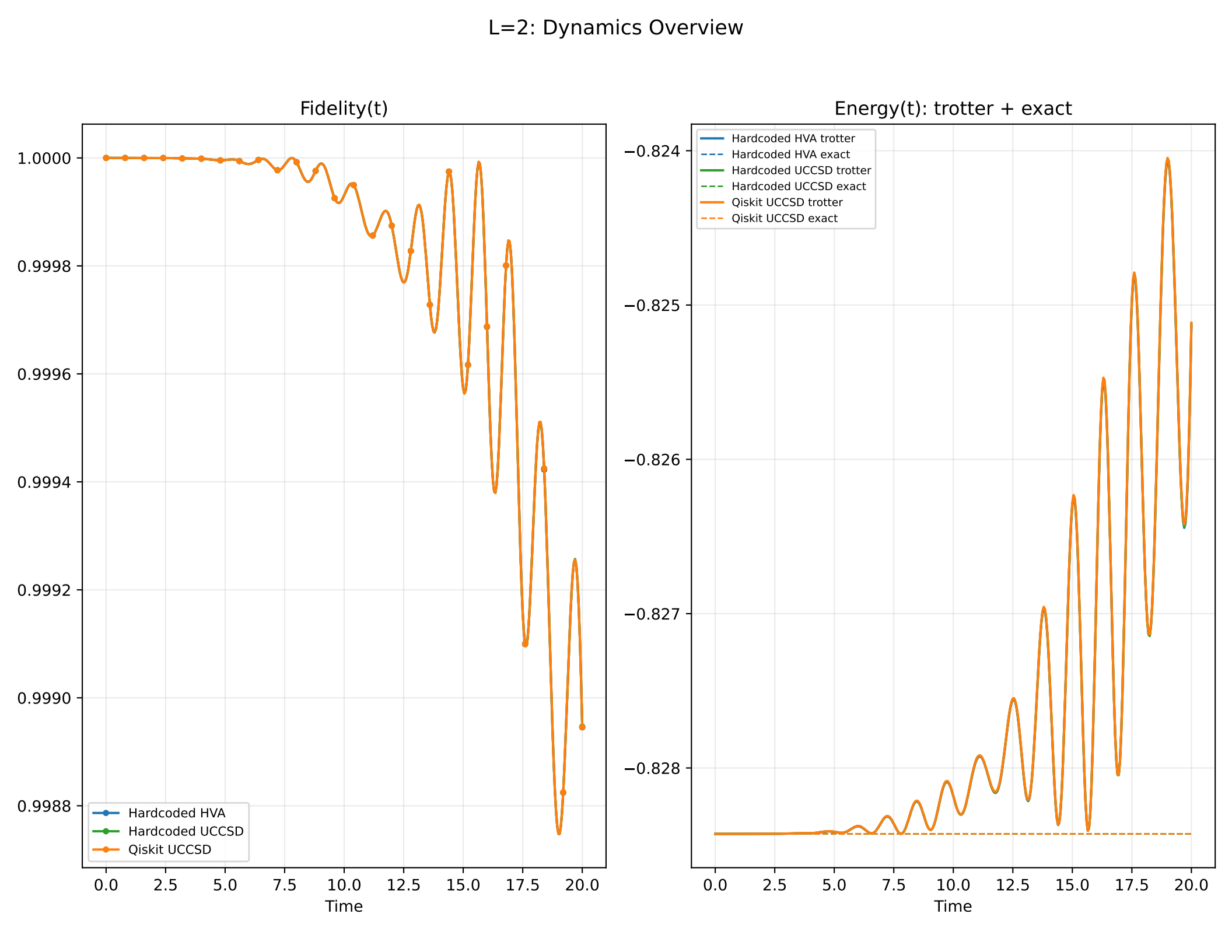
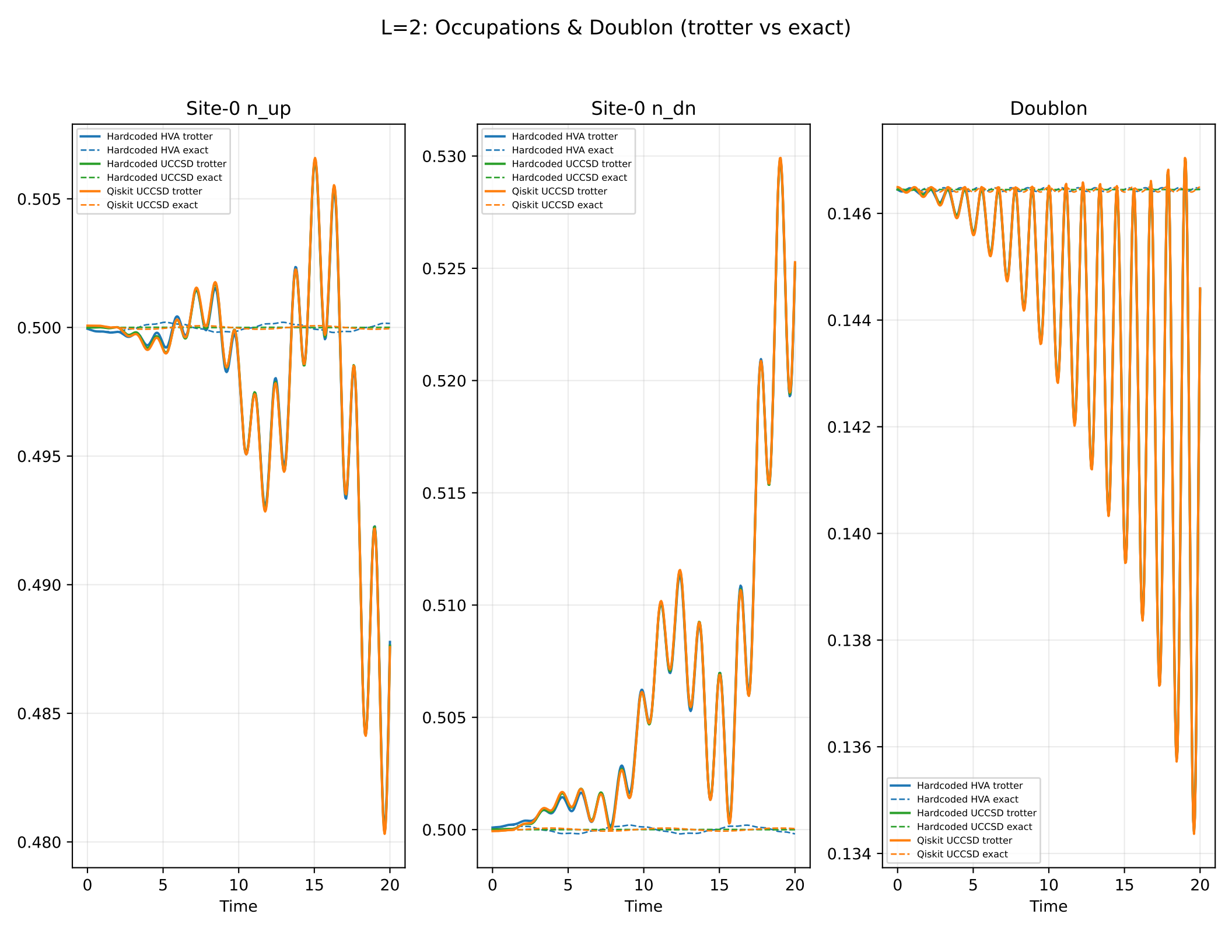
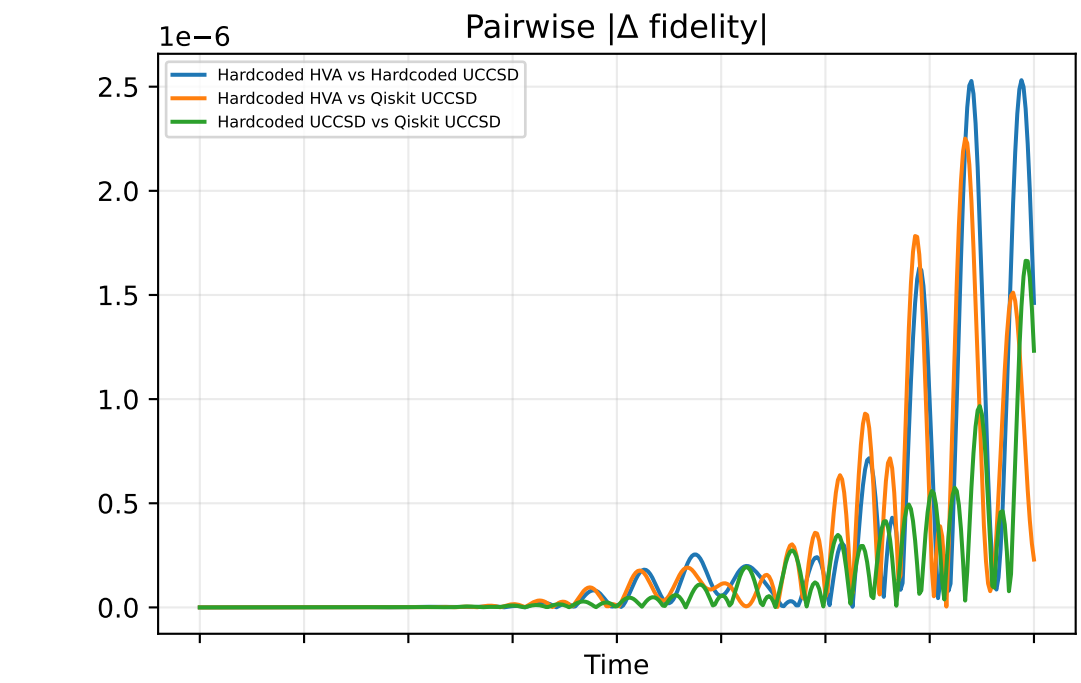
```
L=2 HVA vs UCCSD vs Qiskit-UCCSD

exact_filtered_energy=-0.8284271247461902
hva_vqe_energy=-0.8284270647377743
hardcoded_uccsd_vqe_energy=-0.8284271246665298
qiskit_uccsd_vqe_energy=-0.8284270960159438

sanity:
  exact_filtered_finite=True
  vqe_energy_finite={'hva': True, 'hardcoded_uccsd': True, 'qiskit_uccsd': True}
  vqe_energy_ge_exact_filtered_minus_1e-8={'hva': True, 'hardcoded_uccsd': True, 'qiskit_uccsd': True}
  all_pass=True
```

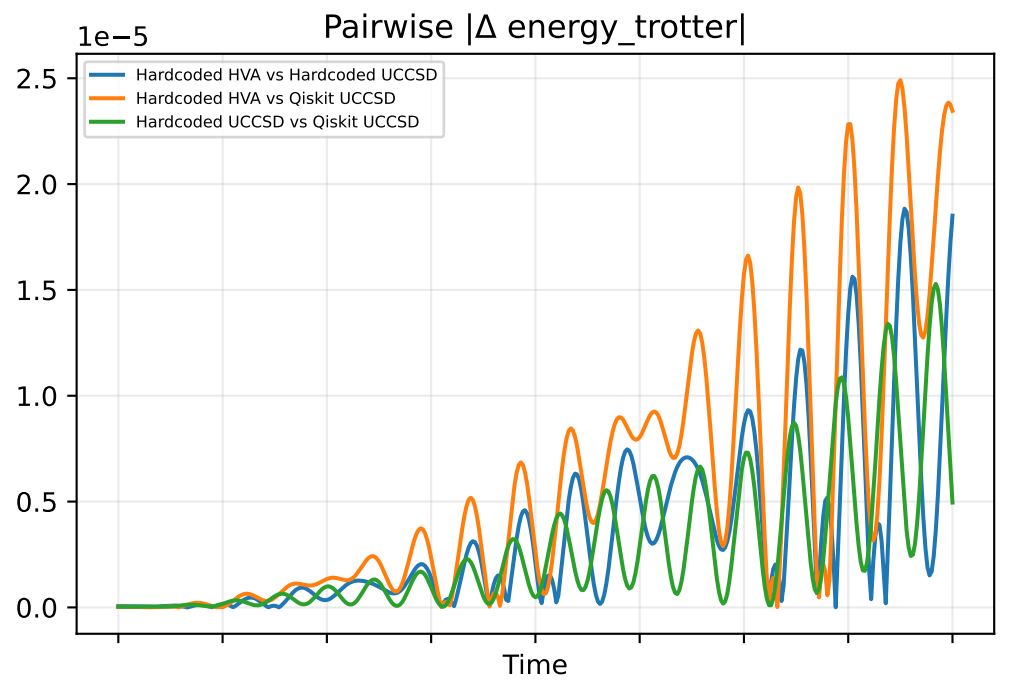

L=2: Ground-State Comparison
VQE Energy Comparison
Energy
0.0
−0.1
−0.2
−0.3
−0.4
−0.5
−0.6
−0.7
−0.8
Exact(filtered)
Hardcoded HVA
Hardcoded UCCSD
Qiskit UCCSD
VQE Absolute Error
1e−8
|E_vqe - E_exact(filtered)|
6
5
4
3
2
1
0
Hardcoded HVA
Hardcoded UCCSD
Qiskit UCCSD

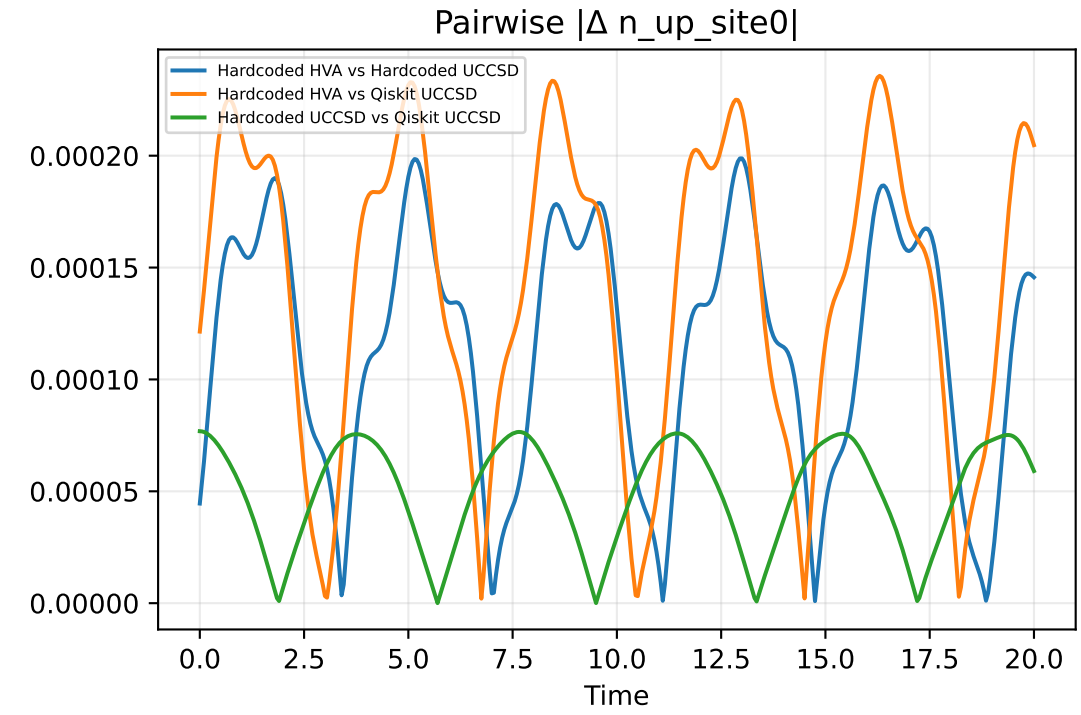

L=2: Dynamics Overview
Fidelity(t)
1.0000
0.9998
0.9996
0.9994
0.9992
0.9990
0.9988
Hardcoded HVA
Hardcoded UCCSD
Qiskit UCCSD
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Time
Energy(t): trotter + exact
−0.824
−0.825
−0.826
−0.827
−0.828
Hardcoded HVA trotter
Hardcoded HVA exact
Hardcoded UCCSD trotter
Hardcoded UCCSD exact
Qiskit UCCSD trotter
Qiskit UCCSD exact
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Time

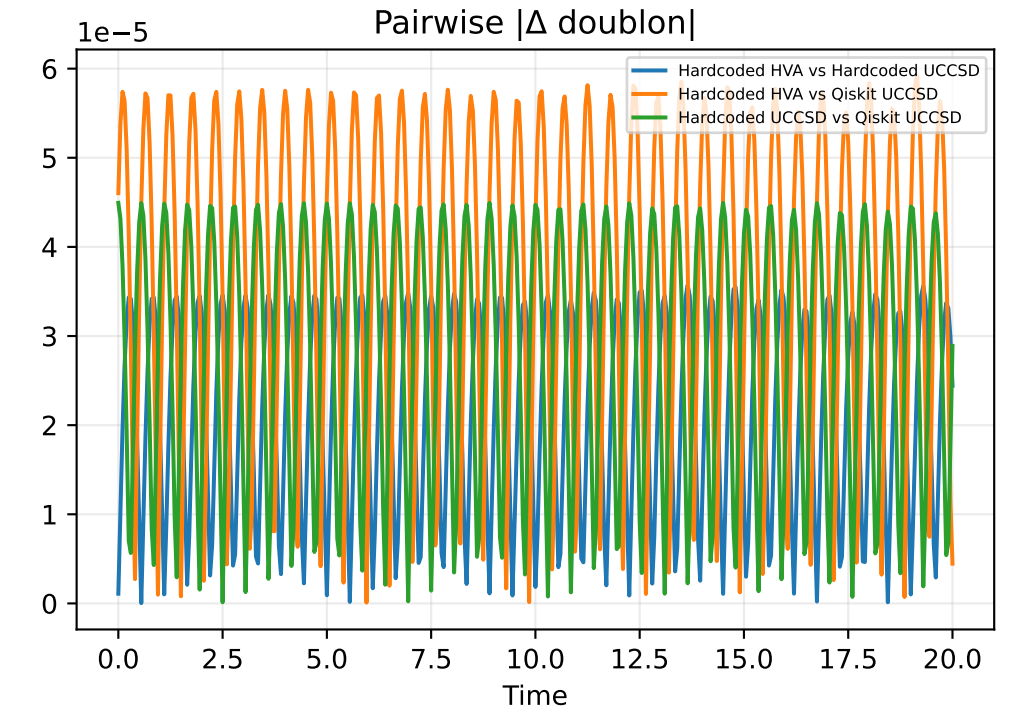

L=2: Occupations & Doublon (trotter vs exact)
Site-0 n_up
Site-0 n_dn
Doublon
Hardcoded HVA trotter
Hardcoded HVA exact
Hardcoded UCCSD trotter
Hardcoded UCCSD exact
Qiskit UCCSD trotter
Qiskit UCCSD exact
Time
0.505
0.500
0.495
0.490
0.485
0.480
0.530
0.525
0.520
0.515
0.510
0.505
0.500
0.146
0.144
0.142
0.140
0.138
0.136
0.134
0
5
10
15
20

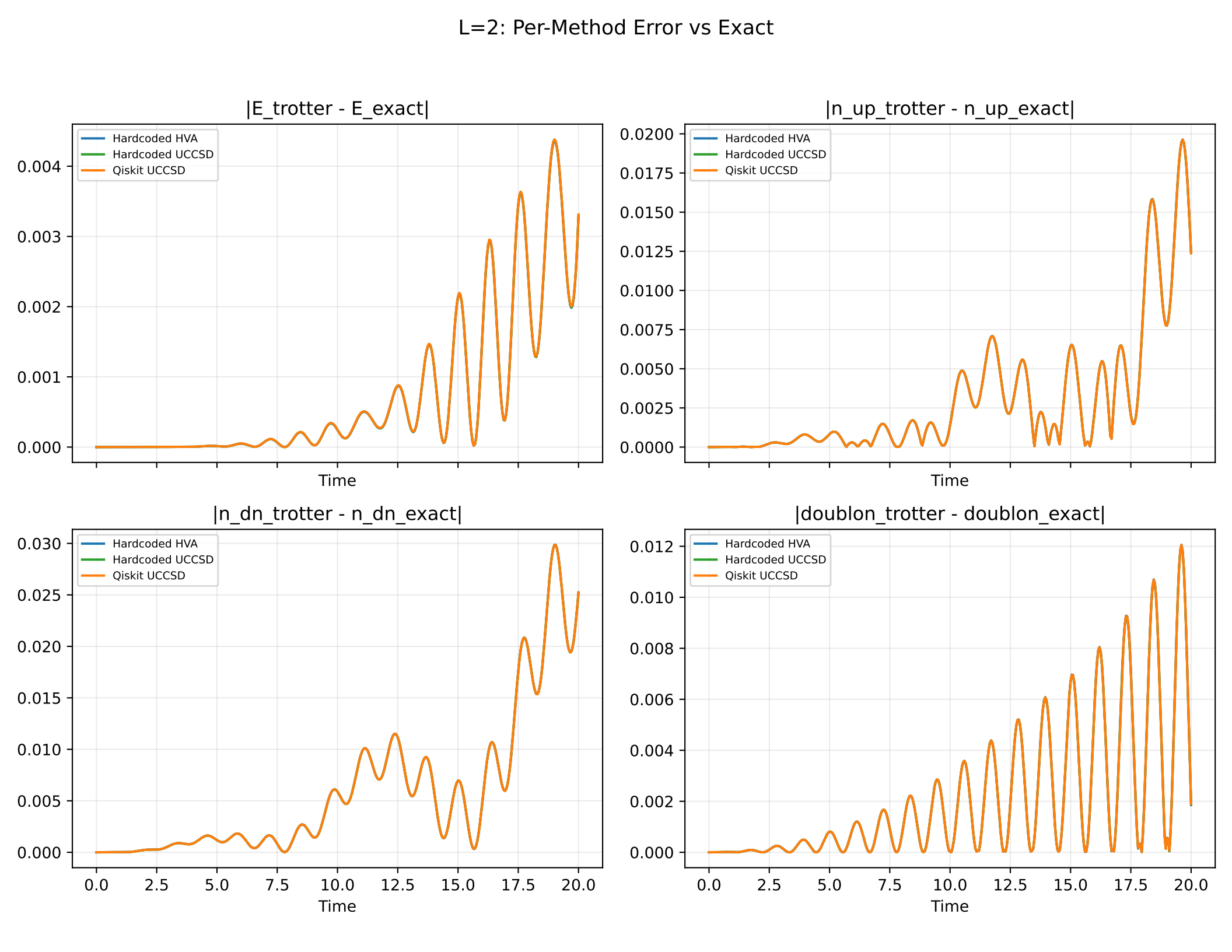
L=2: Pairwise Deltas










L=2: Per-Method Error vs Exact
|E_trotter - E_exact|
|n_up_trotter - n_up_exact|
|n_dn_trotter - n_dn_exact|
|doublon_trotter - doublon_exact|
Hardcoded HVA
Hardcoded UCCSD
Qiskit UCCSD
Time