WASHINGTON STATE
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Scalable Multi-Period Optimal Power Flow
for Active Power Distribution Systems

or simply, Scalable MP-OPF in ADS

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Comparison of BFM-NL-1ph and LinDistFlow-1ph Optimization Results

LinDistFlow Optimal Actions used in OpenDSS

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Full 24 Hour Horizon Validation Results
6. Horizon Total Substation Power Cost: $2798.4
7. Horizon Total Line Loss: 461.38 kW
8. Horizon Total Substation Power: 21065.89 kW + 12259.29 kVAr
9. Horizon Total Load: 21357.37 kW + 11751.08 kVAr
10. Horizon Total Generation: 752.65 kW + 399.75 kVAr
11. Horizon Total Static Capacitor Reactive Power Generation: 0.0 kVAr
12. Horizon Total PV Generation: 607.45 kW + 195.12 kVAr
13. Horizon Total Battery Generation: 145.21 kW + 204.63 kVAr
14. Horizon Total Battery Transaction Magnitude: 505.98 kW + 211.47 kVAr
15. Horizon Total SCD Observed: N/A
16. Horizon-end Battery Energy Deviation from Reference: 171.36 kWh
17. Horizon-Total All Time Substation Power Peak: 1156.22 kW
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Discrepancies (Maximum All Time):
18. Maximum All Time Voltage Discrepancy: 0.002056 pu
19. Maximum All Time Line Loss Discrepancy: 1.807435 kW
20. Maximum All Time Substation Borrowed Real Power Discrepancy: 32.362217 kW
21. Maximum All Time Substation Borrowed Reactive Power Discrepancy: 64.402519
kVAr
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BFM-NL Optimal Actions used in OpenDSS

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Full 24 Hour Horizon Validation Results
6. Horizon Total Substation Power Cost: $2787.64
7. Horizon Total Line Loss: 379.83 kW
8. Horizon Total Substation Power: 20984.05 kW + 6812.67 kVAr
9. Horizon Total Load: 21357.41 kW + 11751.19 kVAr
10. Horizon Total Generation: 753.12 kW + 5681.79 kVAr
11. Horizon Total Static Capacitor Reactive Power Generation: 0.0 kVAr
12. Horizon Total PV Generation: 607.44 kW + 1972.26 kVAr
13. Horizon Total Battery Generation: 145.68 kW + 3709.53 kVAr
14. Horizon Total Battery Transaction Magnitude: 503.3 kW + 3709.53 kVAr
15. Horizon Total SCD Observed: N/A
16. Horizon-end Battery Energy Deviation from Reference: 171.06 kWh
17. Horizon-Total All Time Substation Power Peak: 1114.0 kW
-----------------------------------------------------
Discrepancies (Maximum All Time):
18. Maximum All Time Voltage Discrepancy: 7.2e-5 pu
19. Maximum All Time Line Loss Discrepancy: 0.018184 kW
20. Maximum All Time Substation Borrowed Real Power Discrepancy: 0.431635 kW
21. Maximum All Time Substation Borrowed Reactive Power Discrepancy: 1.010155 kVAr
-----------------------------------------------------
```

Comparison of BFM-NL-1ph and LinDistFlow-1ph Optimization Results

LinDistFlow Own Solutions

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Full 24 Hour Horizon
9. Horizon Total Cost of Substation Power: $ 2731.34
10. Horizon Total Line Loss: 441.07 kW
11. Horizon Total Substation Power: 20604.8 kW + 11351.51 kVAr
12. Horizon Total Load: 21357.46 kW + 11751.26 kVAr
13. Horizon Total Generation: 752.66 kW + 399.75 kVAr
14. Horizon Total Static Capacitor Reactive Power Generation: 0.0 kVAr
15. Horizon Total PV Generation: 607.46 kW + 195.12 kVAr
16. Horizon Total Battery Generation: 145.21 kW + 204.63 kVAr
17. Horizon Total Battery Transaction Magnitude: 505.98 kW + 211.47 kVAr
18. Horizon Total SCD Observed: 0.02 kW
19. Horizon-end Battery Energy Deviation from Reference: 171.36 kWh
20. Horizon-Total All time Substation Power Peak: 1123.86 kW

21. Number of Macro-Iterations: 1
22. Simulation Time: 0.67 s
23. Time to solve with sequential (non-parallel) computation: 0.67 s
24. Time to solve if OPF computation parallelized: 0.67 s
```

BFM-NL Own Solutions

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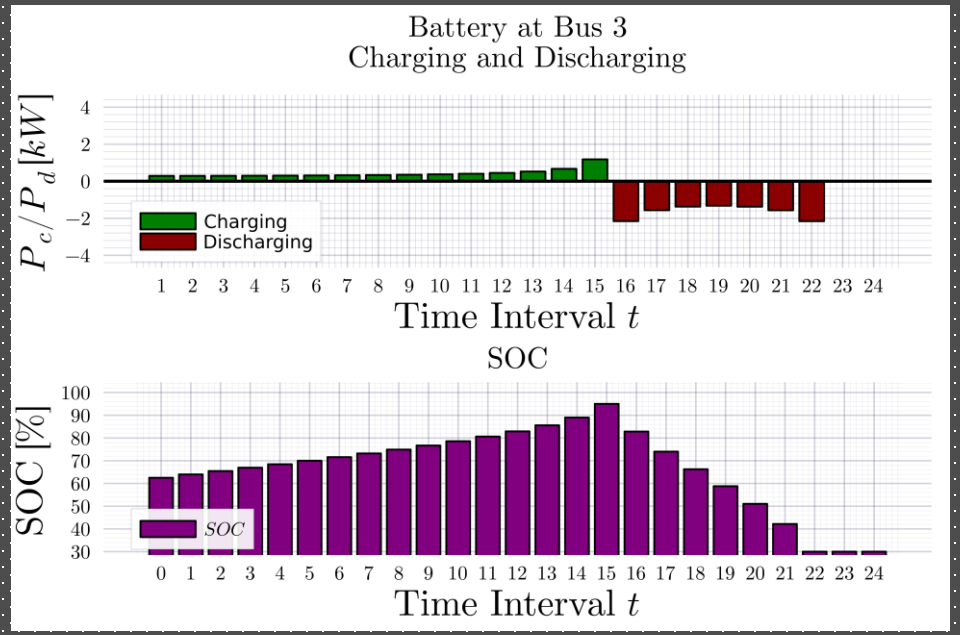
Full 24 Hour Horizon
9. Horizon Total Cost of Substation Power: $ 2787.44
10. Horizon Total Line Loss: 380.09 kW
11. Horizon Total Substation Power: 20984.89 kW + 6835.82 kVAr
12. Horizon Total Load: 21357.46 kW + 11751.26 kVAr
13. Horizon Total Generation: 752.66 kW + 5681.98 kVAr
14. Horizon Total Static Capacitor Reactive Power Generation: 0.0 kVAr
15. Horizon Total PV Generation: 607.46 kW + 1972.27 kVAr
16. Horizon Total Battery Generation: 145.21 kW + 3709.71 kVAr
17. Horizon Total Battery Transaction Magnitude: 505.98 kW + 3709.71 kVAr
18. Horizon Total SCD Observed: 0.02 kW
19. Horizon-end Battery Energy Deviation from Reference: 171.36 kWh
20. Horizon-Total All time Substation Power Peak: 1114.0 kW

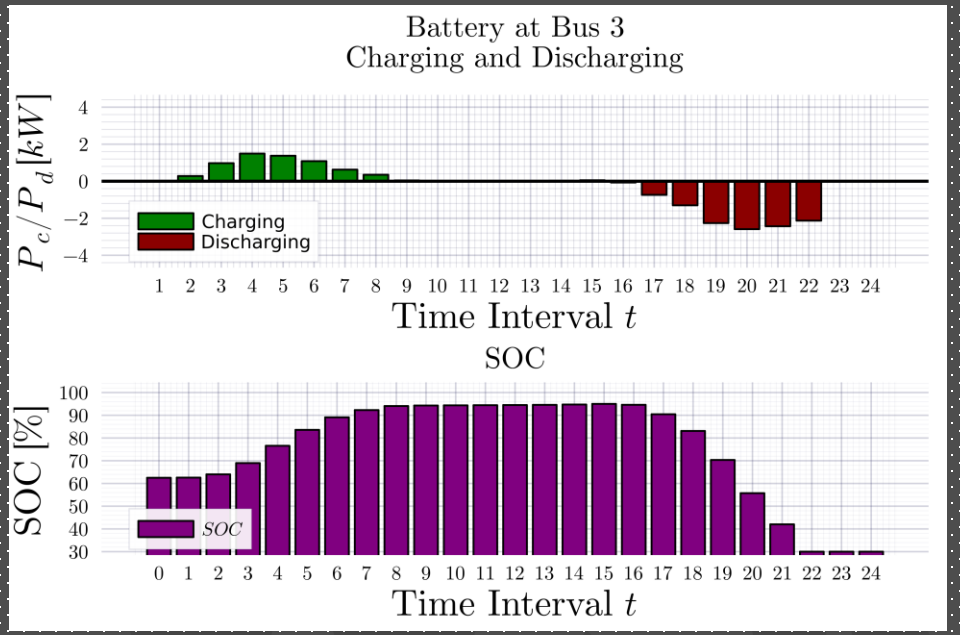
21. Number of Macro-Iterations: 1
22. Simulation Time: 11.64 s
23. Time to solve with sequential (non-parallel) computation: 11.64 s
24. Time to solve if OPF computation parallelized: 11.64 s
```

Comparison of BFM-NL-1ph and LinDistFlow-1ph Optimization Results

LinDistFlow



BFM-NL



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