

TABLE I: Comparative analyses between BFM-NL and LinDistFlow - IEEE123 System for 24 time-period horizon

Metric	BFM-NL	LinDistFlow ⁰
Largest subproblem		
Decision variables	15144	12096
Linear constraints	18456	22200
Nonlinear constraints	3672	0
Simulation results		
Substation power cost (\$)	2787.44	2798.4
Substation real power (kW)	20984.89	21065.89
Line loss (kW)	380.09	461.38
Substation reactive power (kVAR)	6835.82	12259.29
PV reactive power (kVAR)	1972.27	195.12
Battery reactive power (kVAR)	3709.71	204.63
Computation		
Total Simulation Time (s)	17.44	0.85

TABLE IV: ACOPF feasibility analyses - 24 hour

Metric	BFM-NL	LinDistFlow
Max. all-time discrepancy		
Voltage (pu)	0.00007	0.00206
Line loss (kW)	0.01818	1.8074
Substation power (kW)	0.43164	32.362
Substation reactive power (kVAR)	1.0102	64.403

TABLE II: ACOPF feasibility analyses - 5 hour

Metric	MPDOFP	OpenDSS
Full horizon		
Substation real power (kW)	4308.14	4308.35
Line loss (kW)	76.12	76.09
Substation reactive power (kVAR)	656.24	652.49
Max. all-time discrepancy		
Voltage (pu)	0.0002	
Line loss (kW)	0.0139	
Substation power (kW)	0.3431	

TABLE III: Comparison between Nonlinear BFM and LinDistFlow - 10 hour

Metric	Nonlinear BFM	LinDistFlow
Largest subproblem		
Decision variables	6300	2640
Linear constraints	11636	4891
Nonlinear constraints	1270	530
Simulation results		
Substation power cost (\$)	1197.87	1197.87
Substation real power (kW)	8544.28	8544.04
Line loss (kW)	148.67	148.94
Substation reactive power (kVAR)	1092.39	1252.03
PV reactive power (kVAR)	222.59	139.81
Battery reactive power (kVAR)	388.52	310.94
Computation		
Number of Iterations	-	5
Total Simulation Time (s)	4620.73	358.69