

Figure 1: Six Machine System.

System Information

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#   generators
genrou  1 "1" 22.00 "1" : #9 mva=1000.00 ... "h" 5 "d" 0.0000 ... "ra" 0.0000
genrou  2 "2" 22.00 "1" : #9 mva=900.00 ... "h" 3 "d" 0.0000 ... "ra" 0.0000
genrou  2 "2" 22.00 "2" : #9 mva=900.00 ... "h" 3 "d" 0.0000 ... "ra" 0.0000
genrou  3 "3" 22.00 "1" : #9 mva=800.00 ... "h" 4 "d" 0.0000 ... "ra" 0.0000
genrou  4 "4" 22.00 "1" : #9 mva=800.00 ... "h" 4 "d" 0.0000 ... "ra" 0.0000
genrou  5 "5" 22.00 "1" : #9 mva=900.00 ... "h" 4.5 "d" 0.0000 ... "ra" 0.0000

#   exciters (same on all machines)
sexs     1 "1" 22.00 "1" : #9 1.0 5.0 1000.0 0.05 -5.0 5.0 0.1 0.0 -5.0 5.0 0.0

#   governors
tgov1 1 "1" 22.00 "1" : #1 mwcap=1000.0 0.050 0.2 1.00 0.0 -1.0 15.0 0.0
tgov1 2 "2" 22.00 "1" : #1 mwcap=800.00 0.200 0.4 1.00 0.0 3.0 10.0 0.0
tgov1 2 "2" 22.00 "2" : #1 mwcap=800.00 0.200 0.4 1.00 0.0 3.0 10.0 0.0
tgov1 3 "3" 22.00 "1" : #1 mwcap=400.00 0.050 0.4 1.00 0.0 3.0 10.0 0.0
tgov1 4 "4" 22.00 "1" : #1 mwcap=400.00 0.050 0.4 1.00 0.0 3.0 10.0 0.0

.....
At t = 0:
Load on bus 8 = 600 P, 100 Q
Load on bus 9 = 750 P, 100 Q

Generator 1 1 Pgen: 261.3 Qgen: 79.0
Generator 2 1 Pgen: 220.0 Qgen: 75.0
Generator 2 2 Pgen: 220.0 Qgen: 75.0
Generator 3 1 Pgen: 210.0 Qgen: 64.3
Generator 4 1 Pgen: 210.0 Qgen: 64.3
Generator 5 1 Pgen: 230.0 Qgen: 69.8

approx 100 MW Interchange from Area 1 to Area 2 (left to right)

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Step Test: Load on Bus 9 +10% at t=2

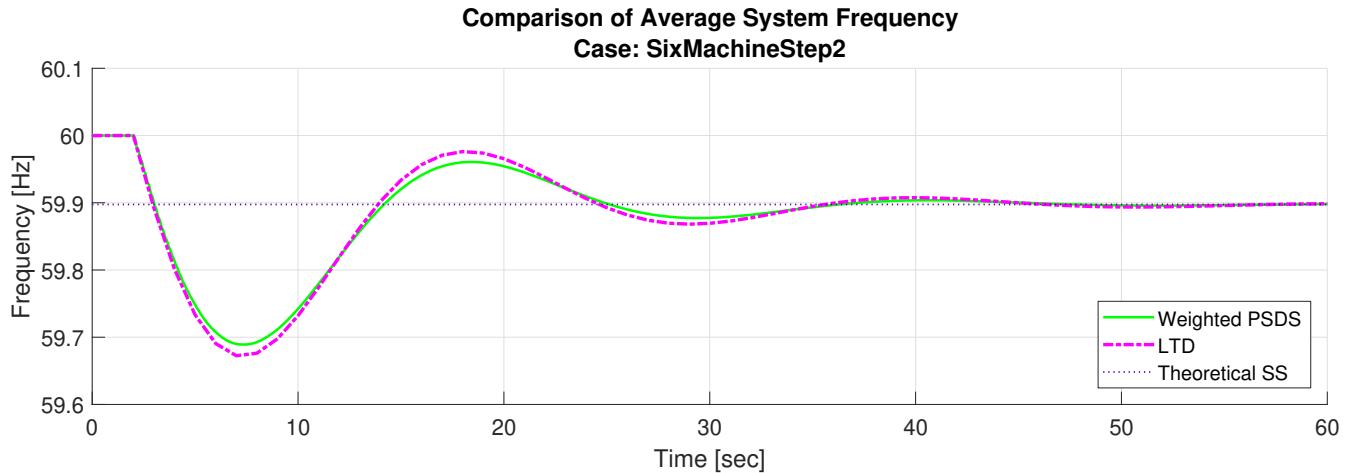


Figure 2: Average system frequency response.

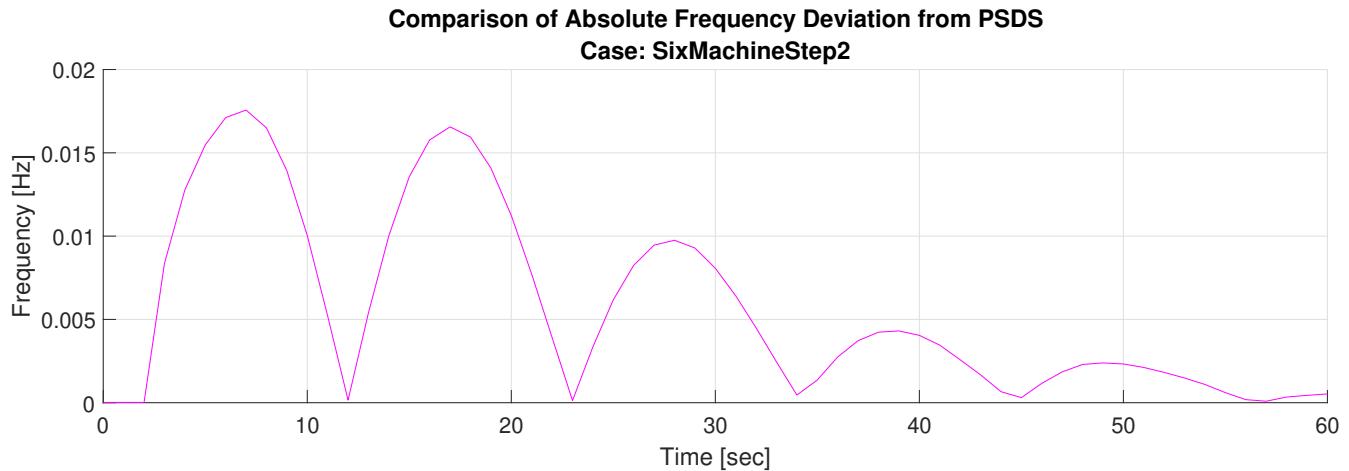


Figure 3: Relative Hz difference of PSDS - LTD (i.e. $|f_{PSDS}(t) - f_{LTD}(t)| \times 60\text{Hz}$).

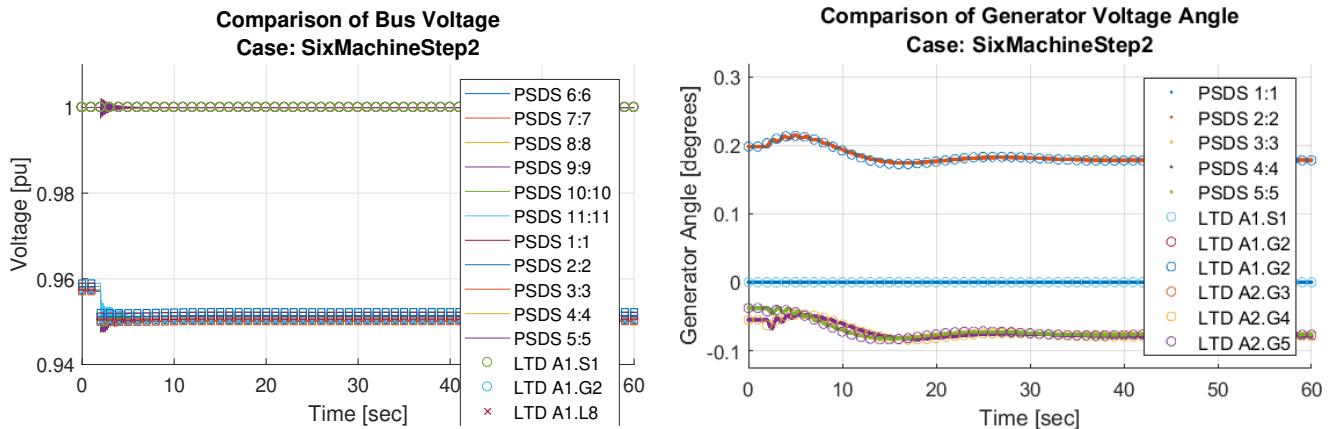


Figure 4: System bus voltages and angles.

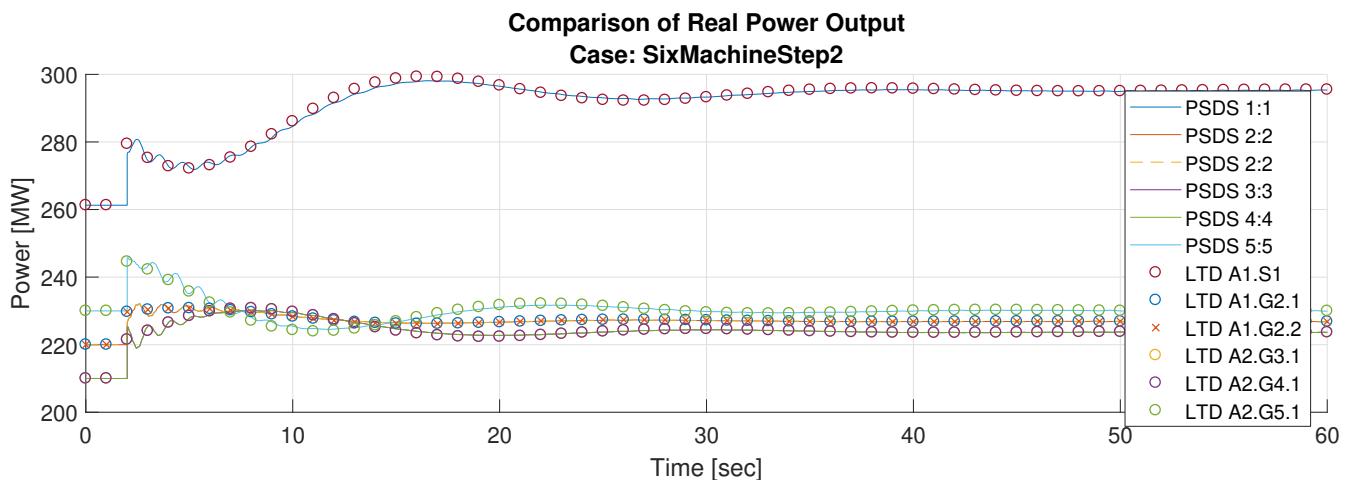


Figure 5: Generator Electrical Power Output

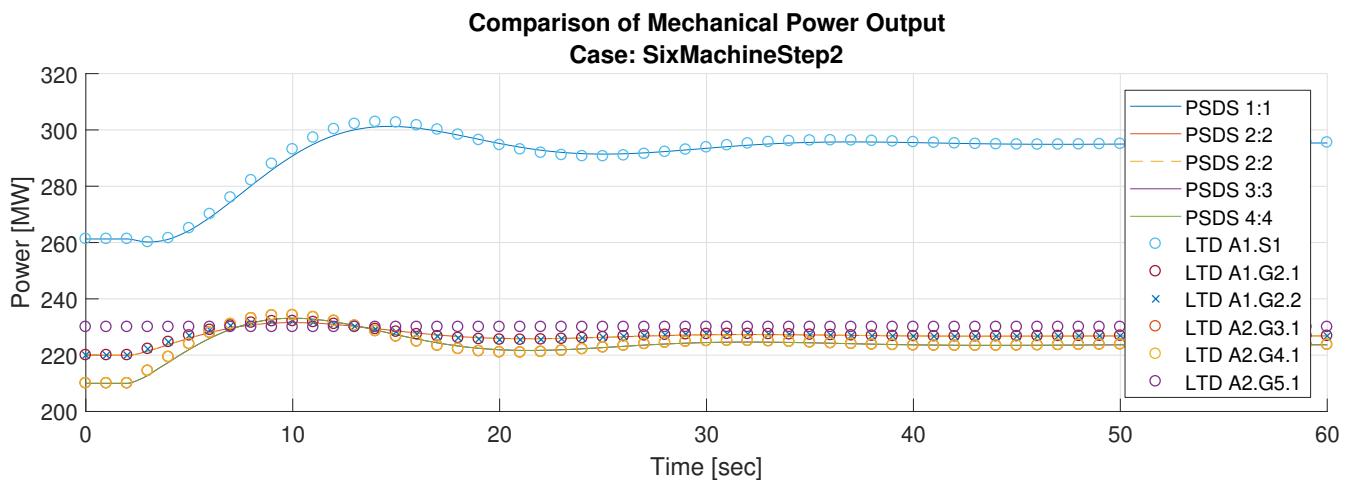


Figure 6: Generator Mechanical Power Output (un-governed machines have no PSDS data)

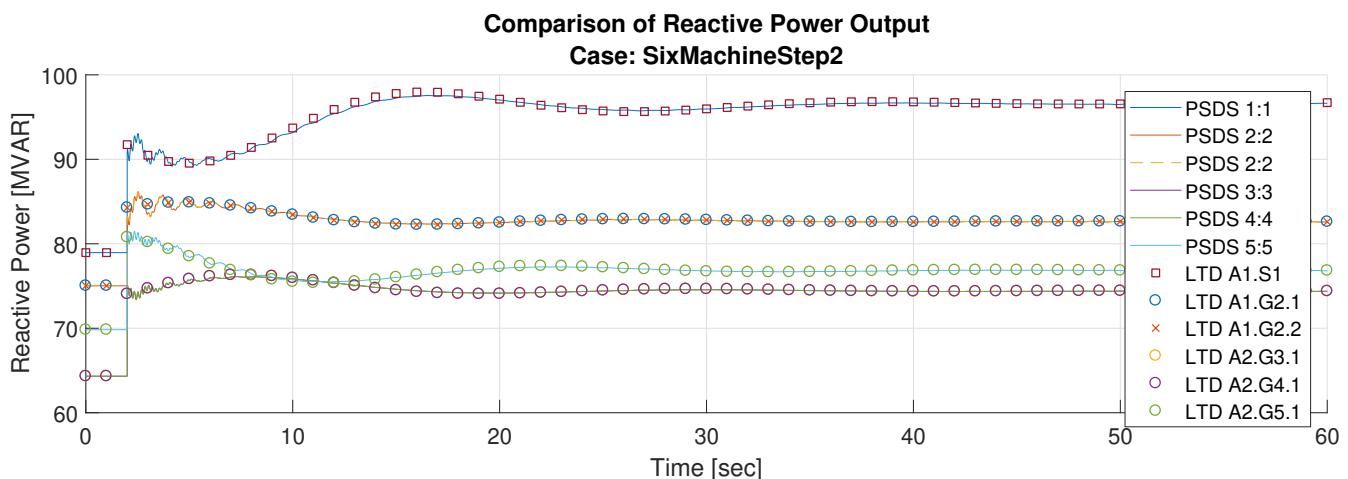


Figure 7: Reactive Power Output

Ramp Test: Load on Bus 9 +10% from t=2 to t=42.

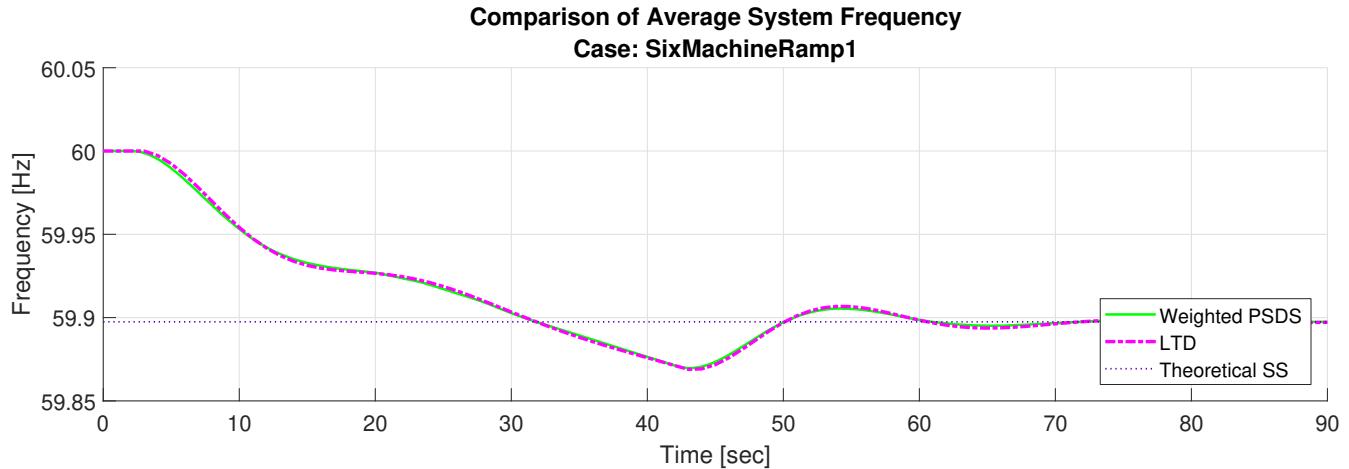


Figure 8: Average system frequency response.

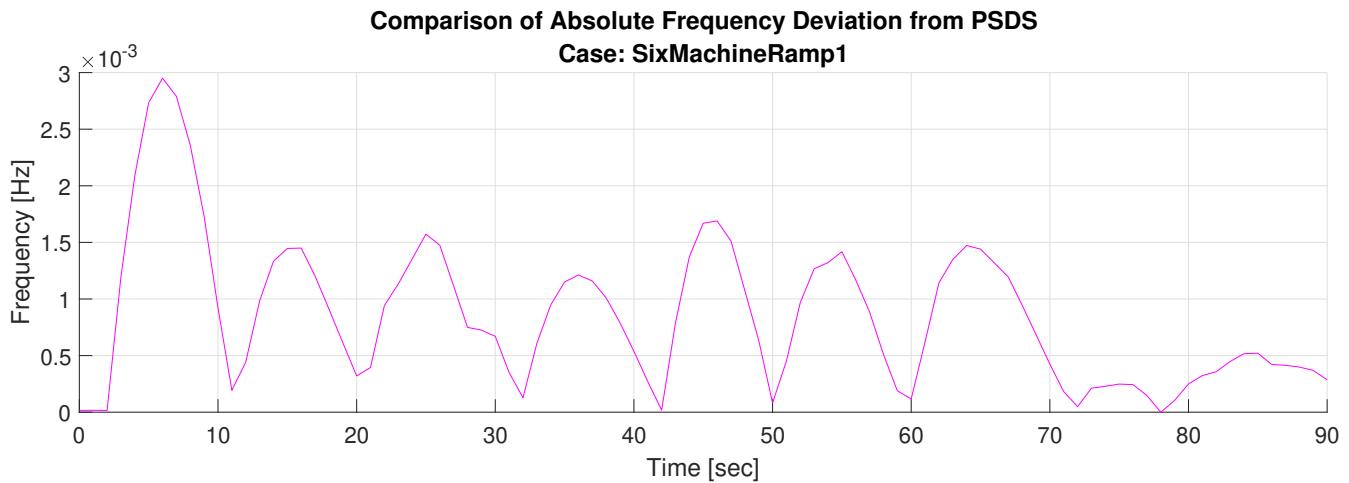


Figure 9: Relative Hz difference of PSDS - LTD (i.e. $|f_{PSDS}(t) - f_{LTD}(t)| \times 60\text{Hz}$).

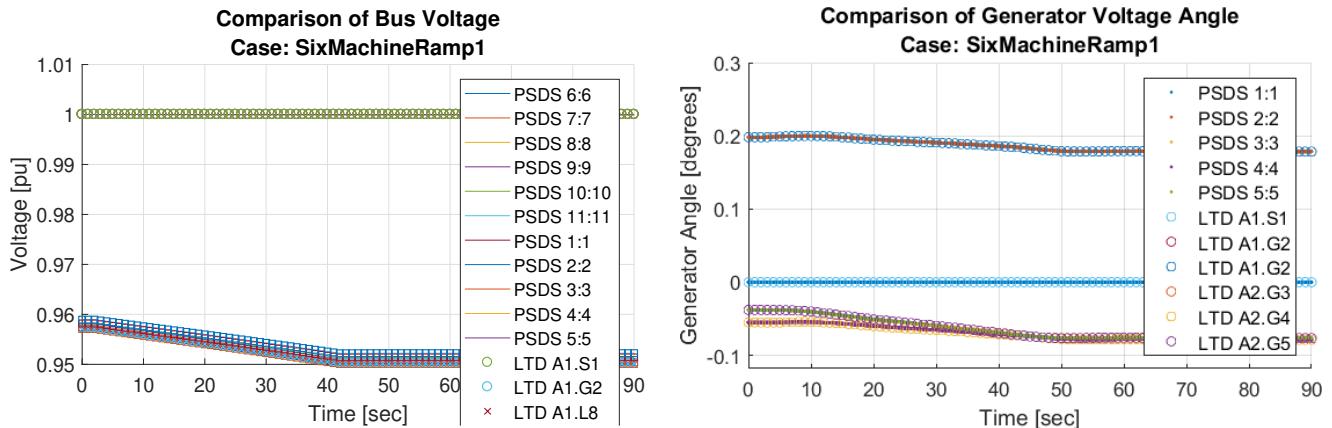


Figure 10: System bus voltages and angles.

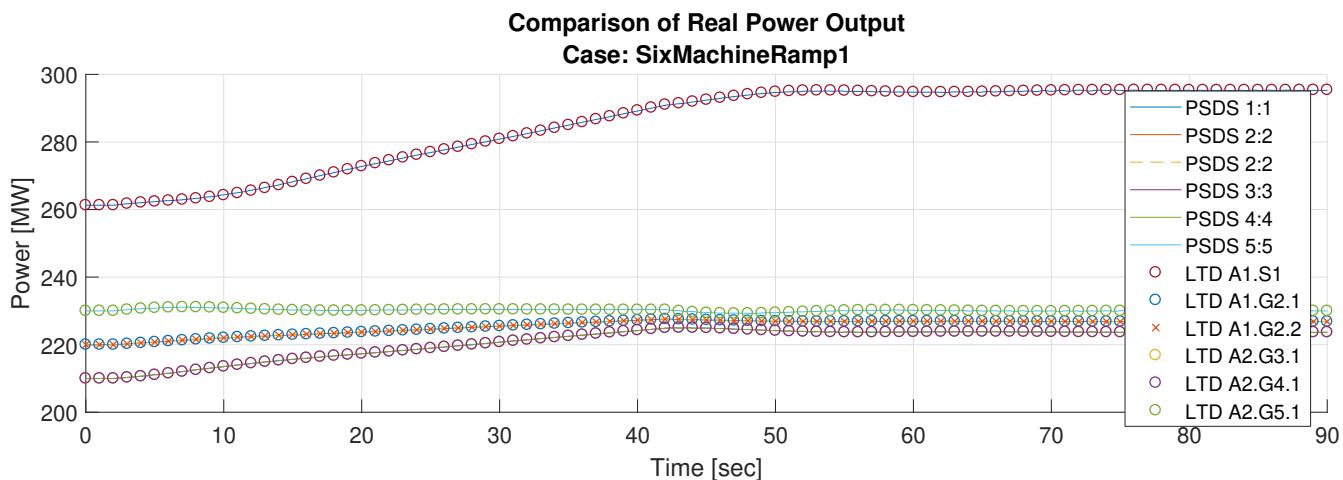


Figure 11: Generator Electrical Power Output

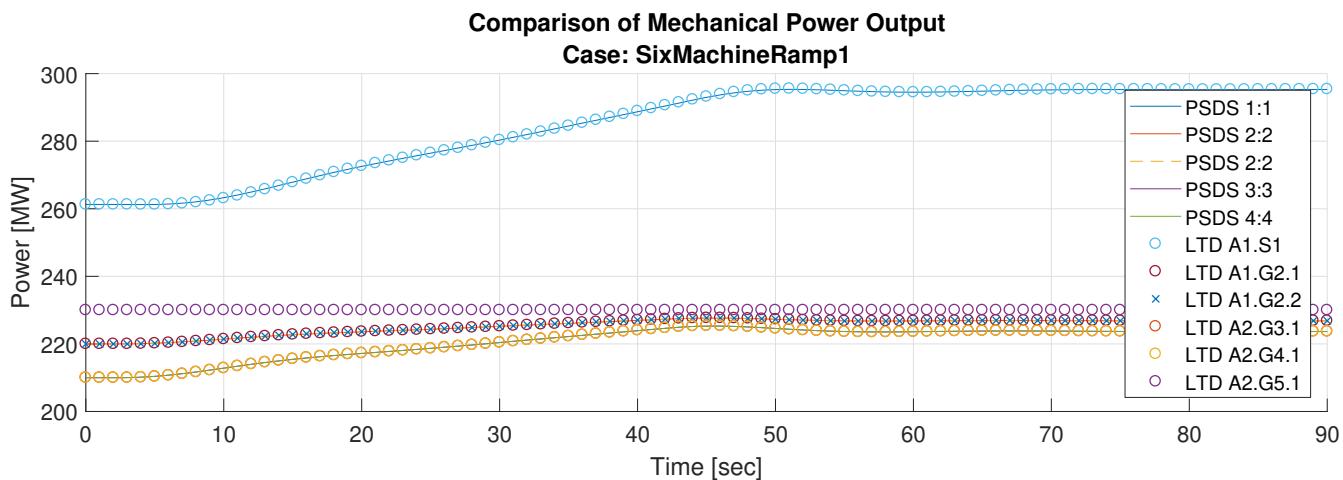


Figure 12: Generator Mechanical Power Output (un-governed machines have no PSDS data)

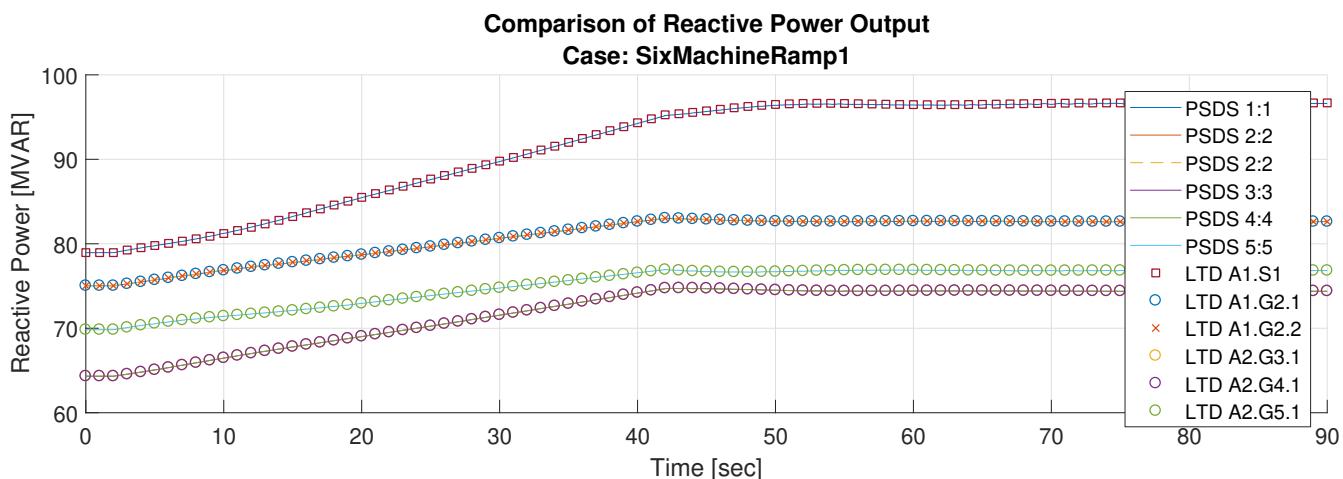


Figure 13: Reactive Power Output