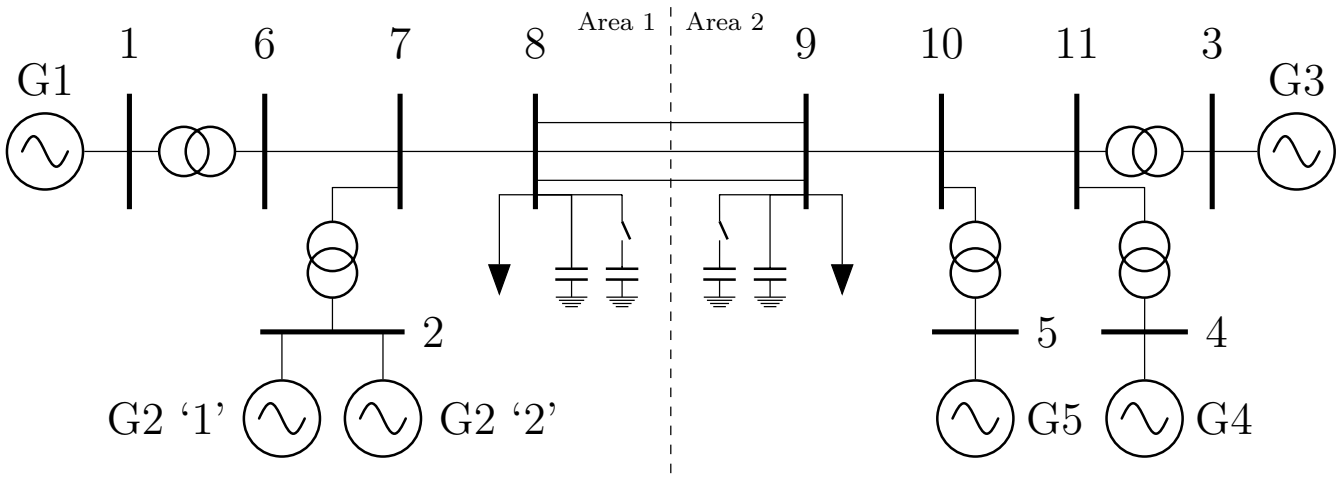

Figure 1: Six Machine System.

System Information

```
#   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: 261.4 Qgen: 82.8
Generator 2  1 Pgen: 220.0 Qgen: 77.1
Generator 2  2 Pgen: 220.0 Qgen: 77.1
Generator 3  1 Pgen: 280.0 Qgen: 87.0
Generator 4  1 Pgen: 280.0 Qgen: 87.0
Generator 5  1 Pgen: 90.0  Qgen: 49.9

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

Generator Trip Test: Generator on Bus 5 tripped off at t=2. Simulation use 0.5 second timestep.

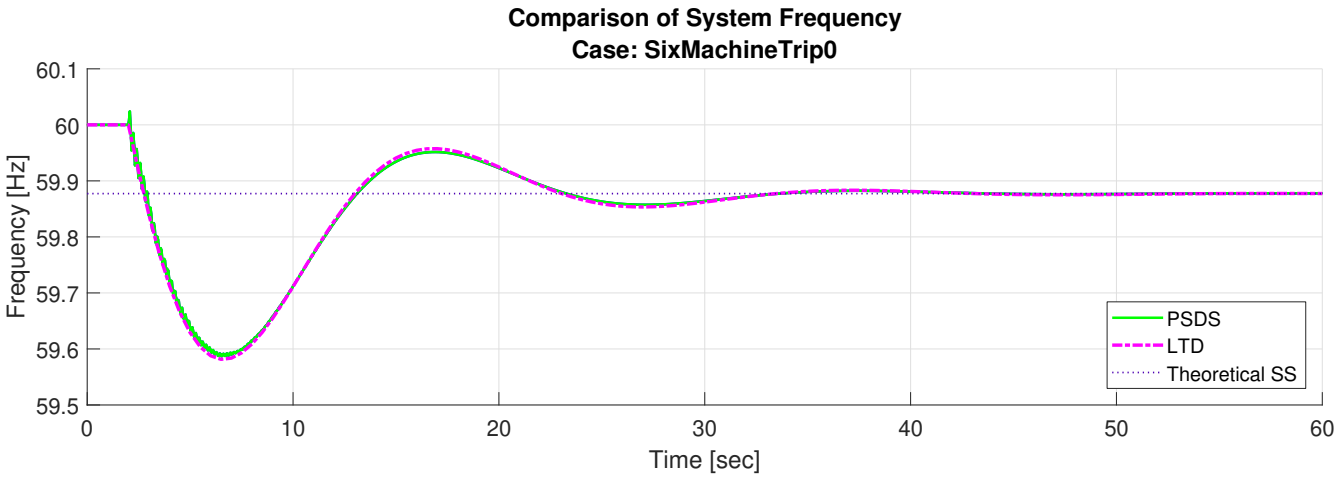

Figure 2: Average system frequency response.

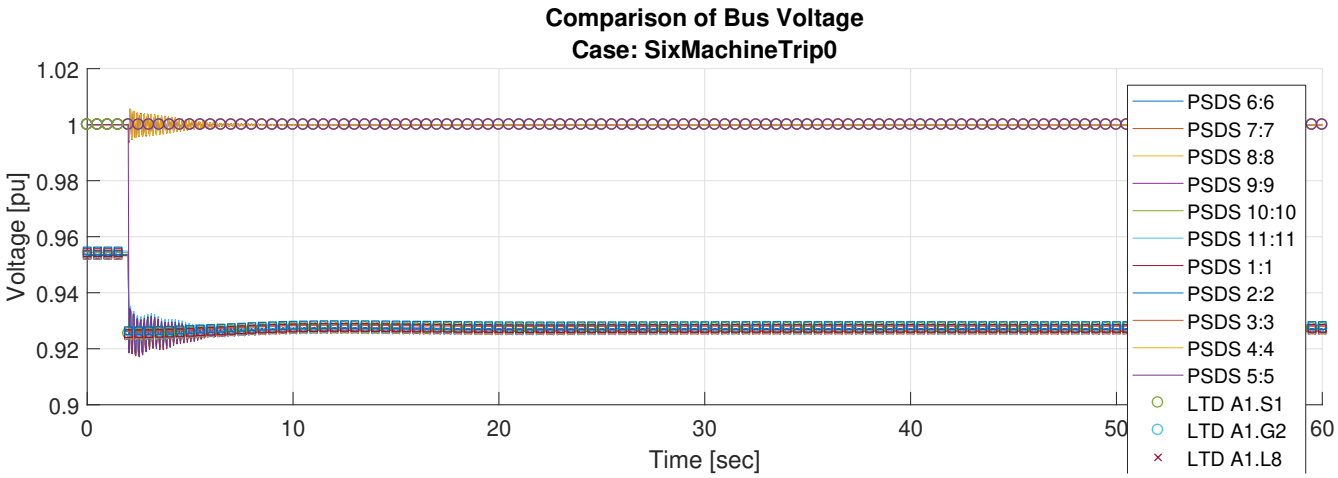

Figure 3: Voltage Magnitude Comparison.

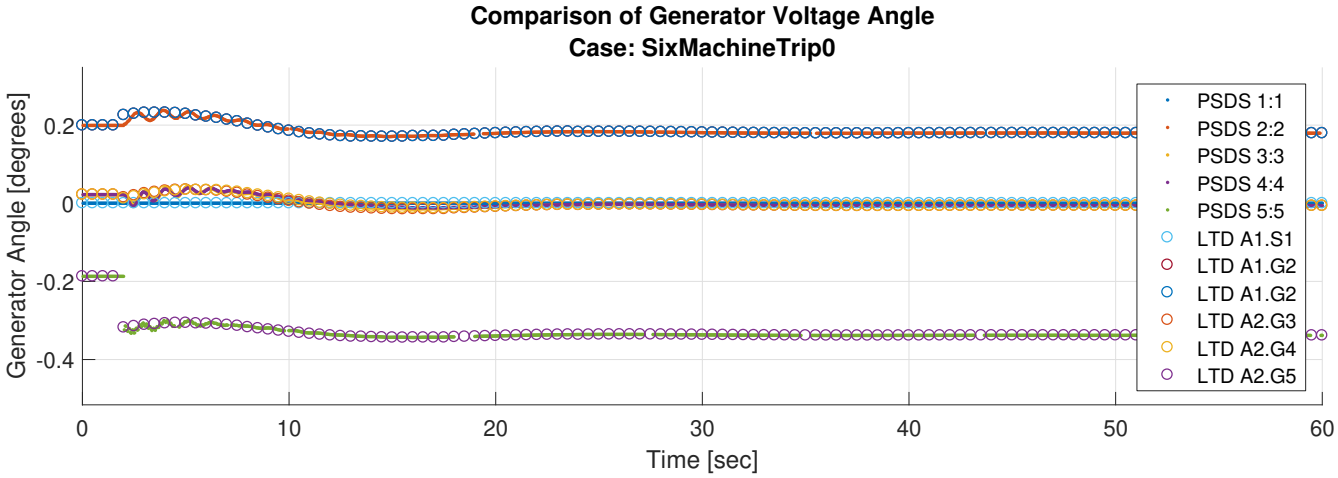

Figure 4: Voltage Angle Comparison.

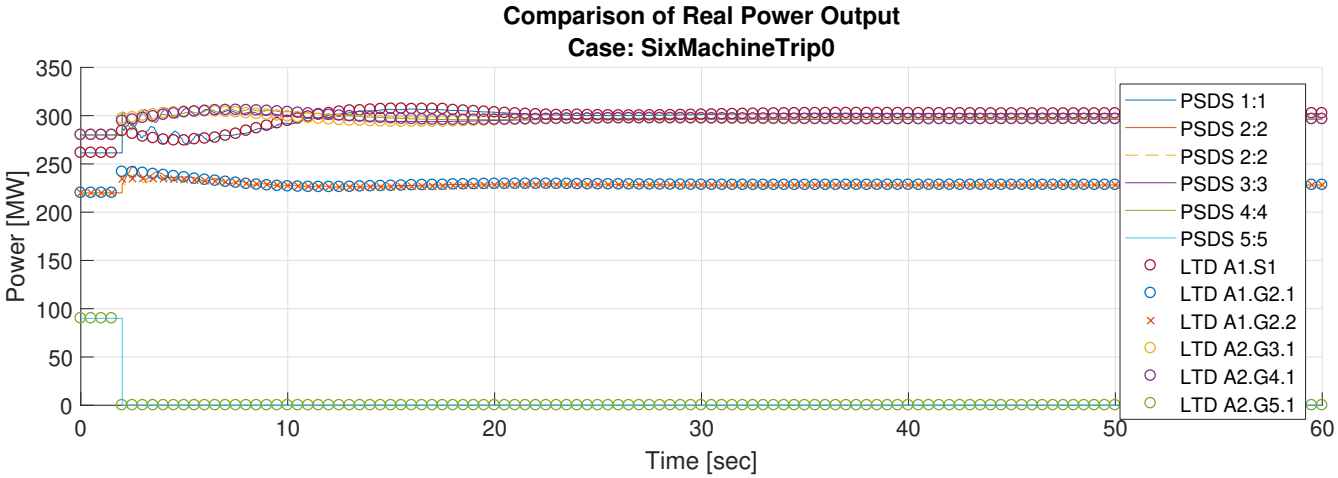

Figure 5: Generator Electrical Power Output

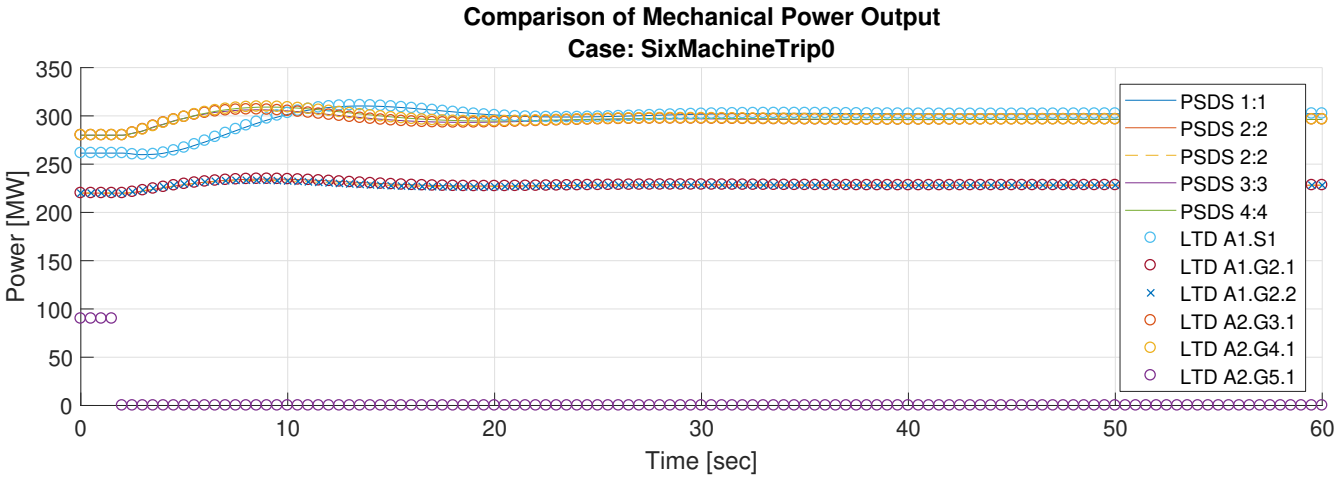

Figure 6: Generator Mechanical Power Output (un-governed machines have no PSDS data)

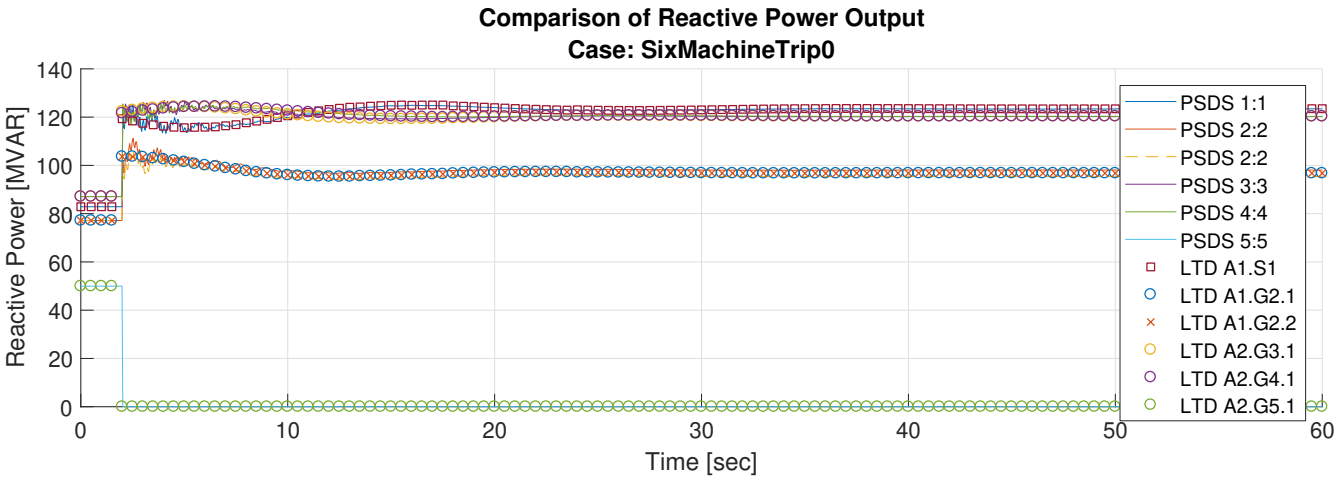

Figure 7: Reactive Power Output

Branch Trip Test: Two branch section between bus 8 and 9 were tripped at t=2. Simulation use 0.5 second time step. Theoretical SS in Figure 8 based of change in load while in Figure 9 is based on change in System Pe.

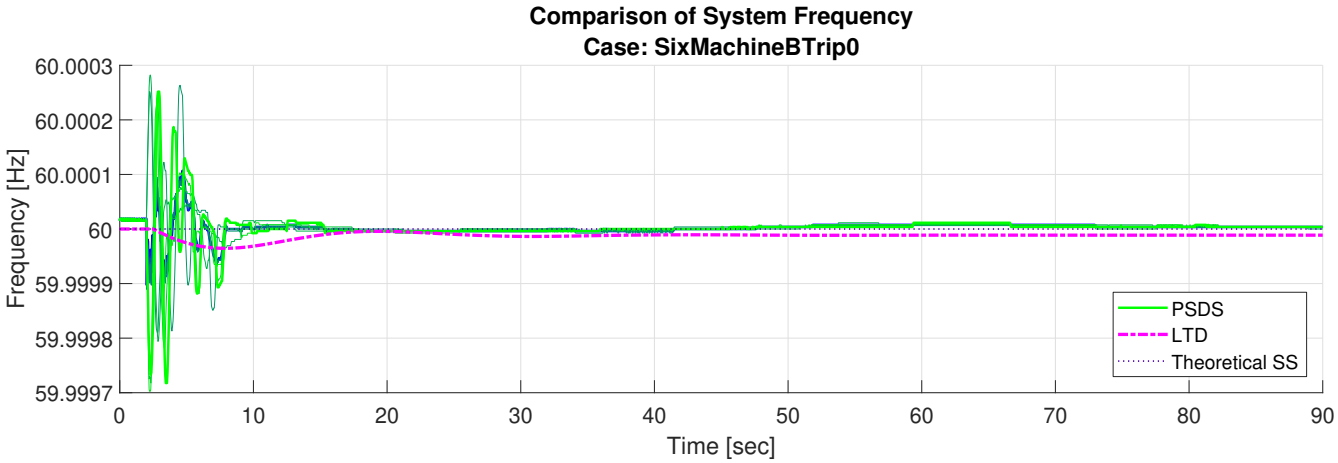

Figure 8: Average system frequency response.

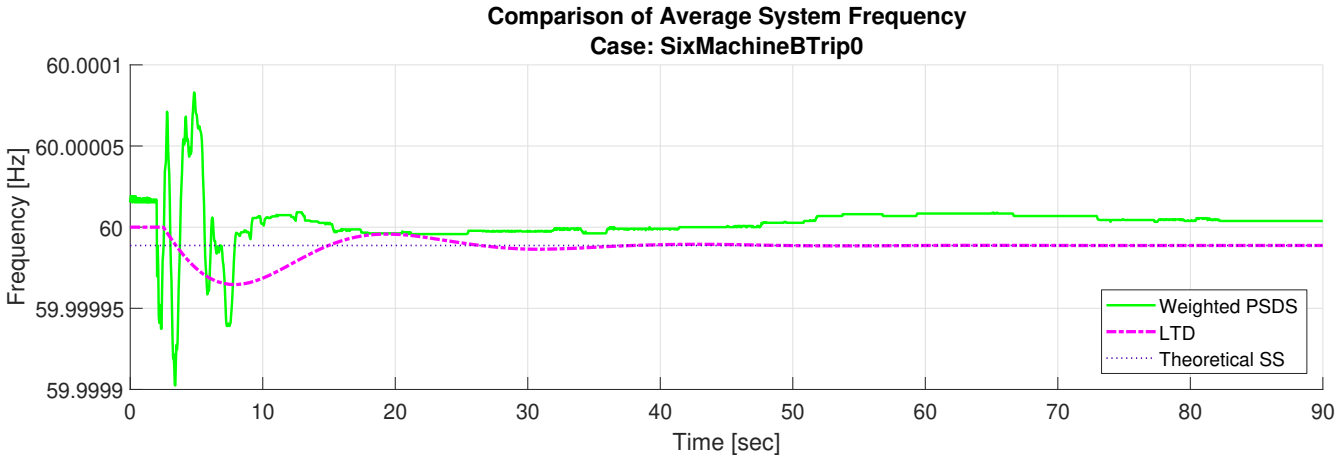

Figure 9: Weighted Frequency Comparison

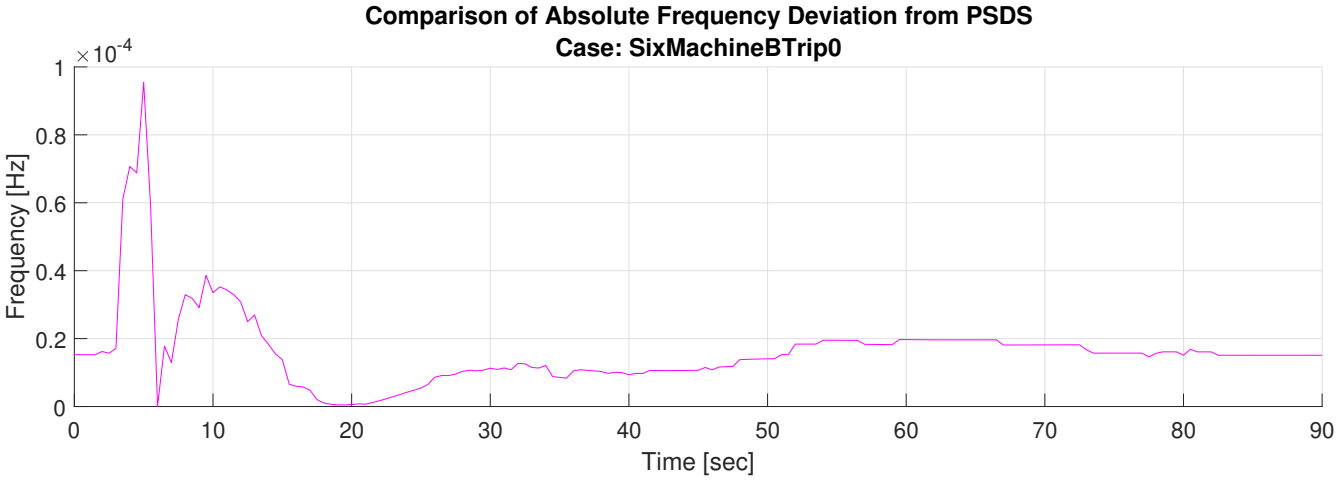

Figure 10: Relative Hz difference of PSDS - LTD $\left(\text{i.e. } \left|f_{PSDS}(t) - f_{LTD}(t)\right| \times 60\text{Hz}\right)$.