

Long Term Simulation of Power System Dynamics using Time Sequenced Power Flows

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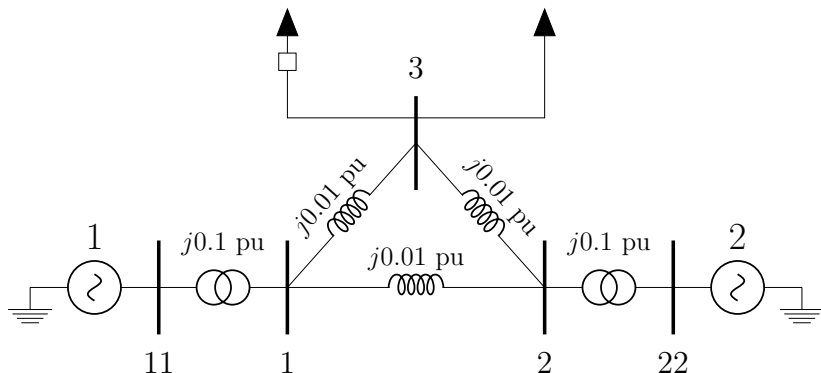
Montana Tech - Master's Thesis Research Project

February 5th, 2019

Overview of what the plan is system assumptions goals

Overview of parts involved in simulation
(sequence diagram)
other explanations about computery stuff

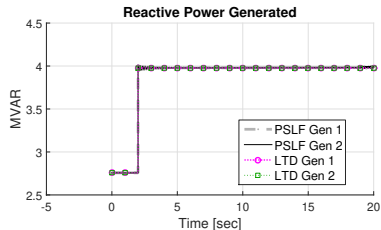
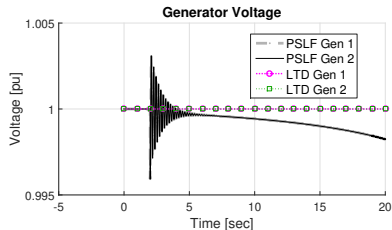
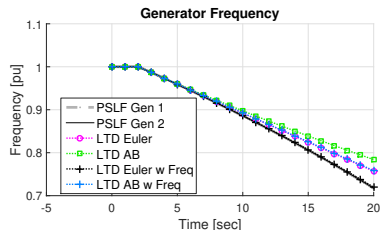
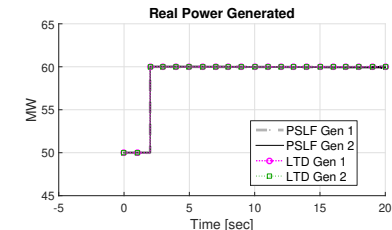
EE554.sav test system:



Generators are identical.
PSLF models have exciters.

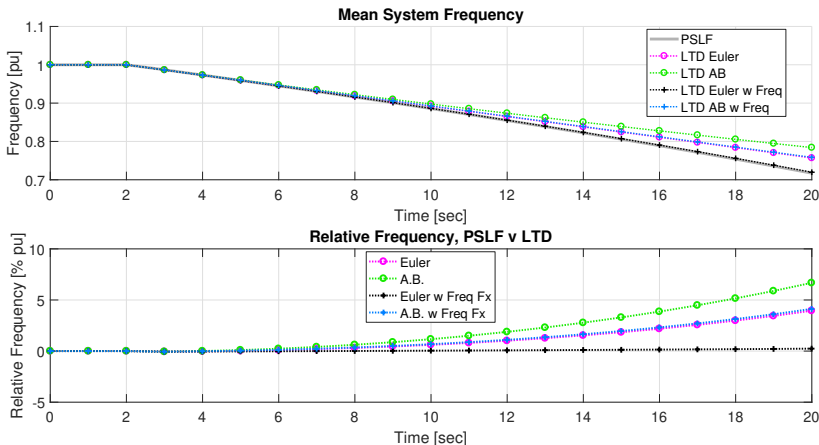
+20 MW Load Step at $t=2$

System Response



+20 MW Load Step at $t=2$

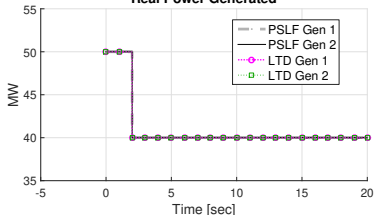
Detailed Frequency Response



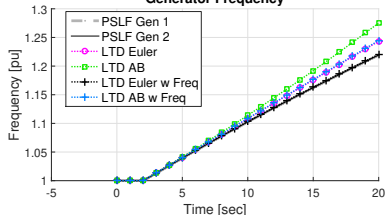
-20 MW Load Step at $t=2$

System Response

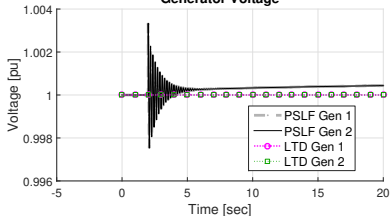
Real Power Generated



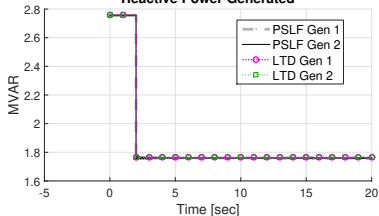
Generator Frequency



Generator Voltage

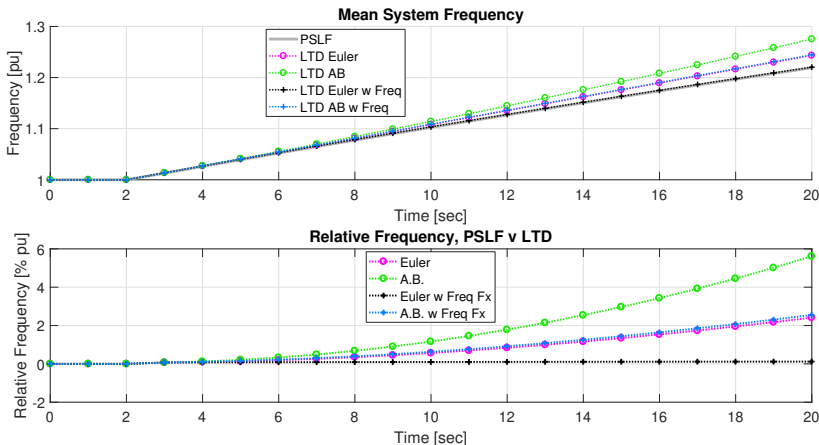


Reactive Power Generated

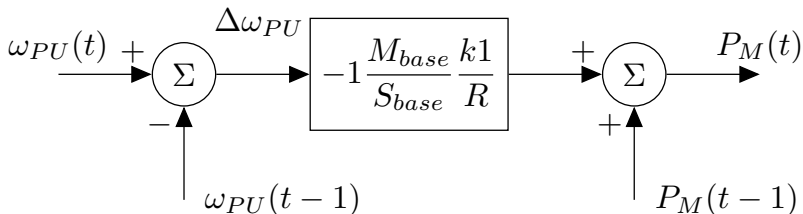


-20 MW Load Step at $t=2$

Detailed Frequency Response



Proportional gain control of generator P_M

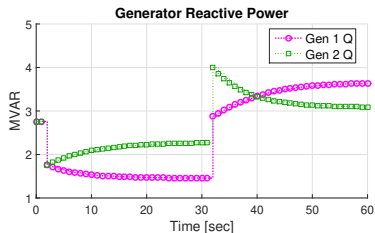
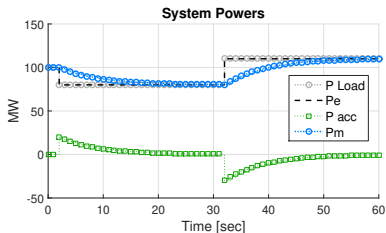
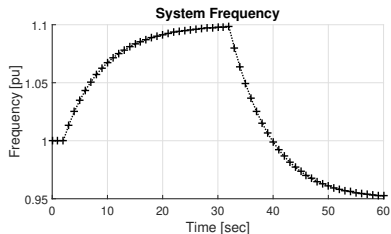
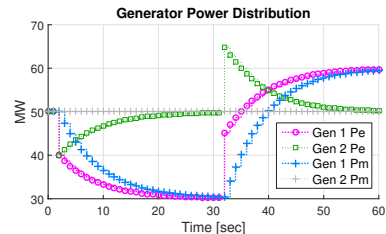


Entered into system via parsed text file:

```
# pgov1 busnum busnam basekv id : #9 mwcap droop k1
#!pgov1 21 "21" 22.00 "1 " : #9 mwcap=100.0 0.05 13.0
```

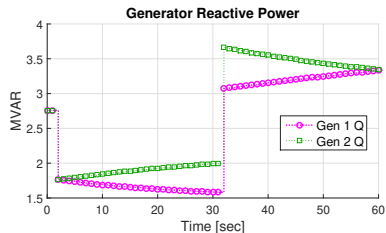
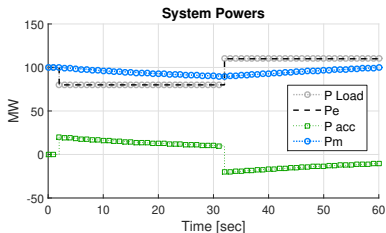
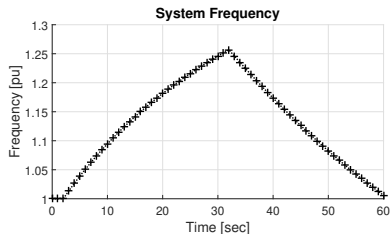
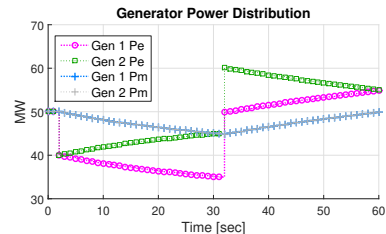
Dynamic model 'pgov1' experiment: -20 MW $t=2$, +30 MW $t=32$

pgov1 on Gen 1



Dynamic model 'pgov1' experiment: -20 MW $t=2$, +30 MW $t=32$

pgov1 on Gen 1 & Gen 2



- ▶ Frequency effects should be accounted for in swing equation.
- ▶ Euler Integration tracks PSLF mean frequency well.
- ▶ Custom dynamic model implementation seems realizable.