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

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Montana Tech - Master's Thesis Research Project

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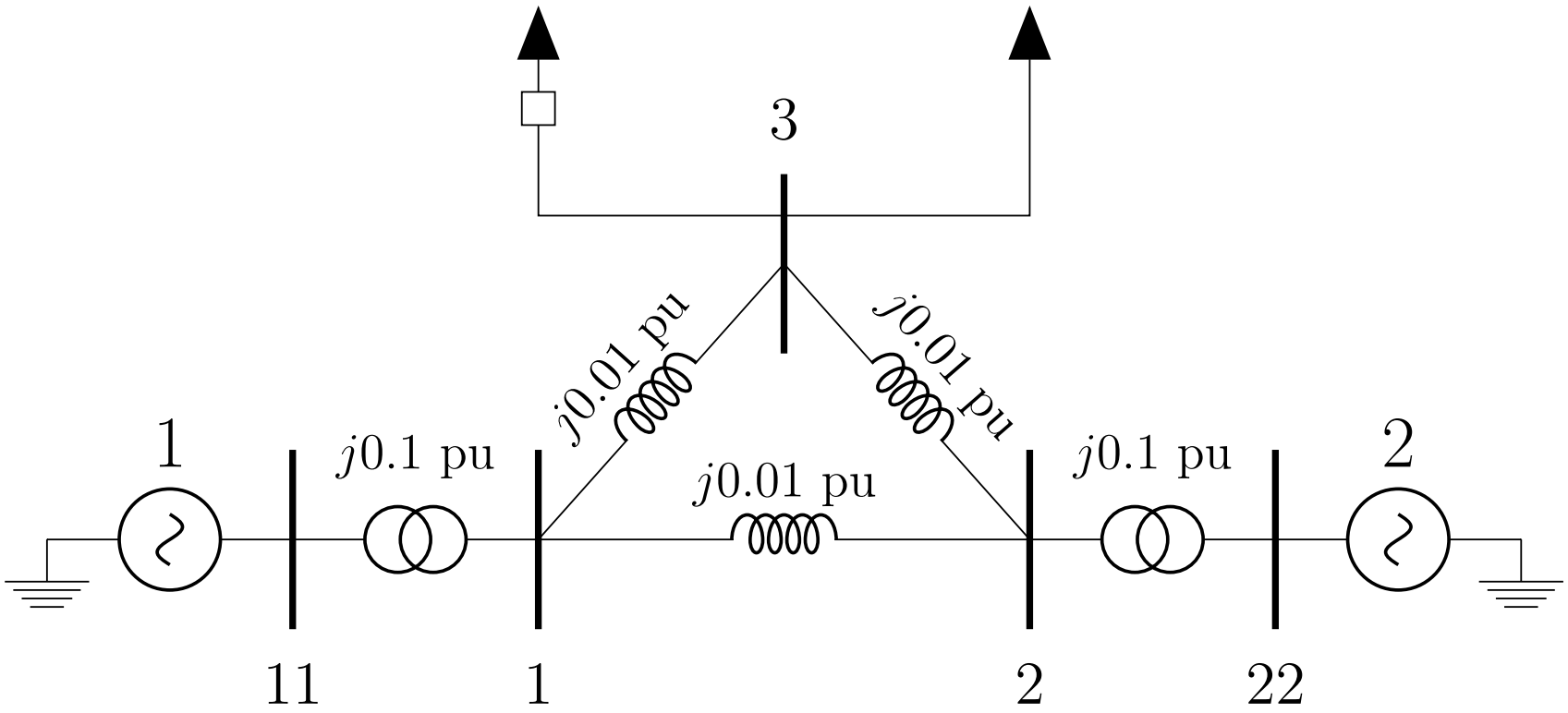
TODO:
What is LTD - why use it
system assumptions/main methods of LTD
goals of research/ code

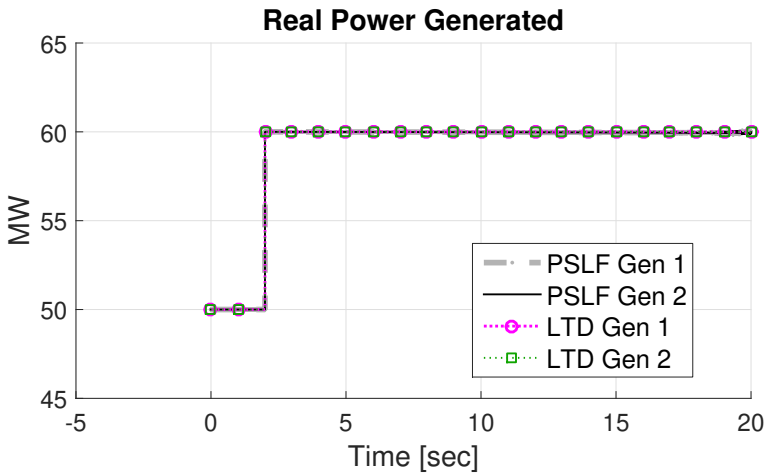
TODO:
Overview of parts involved in simulation (sequence diagram)
other explanations about computery stuff:
ipy vs py?
flow chart of predicted work flow.

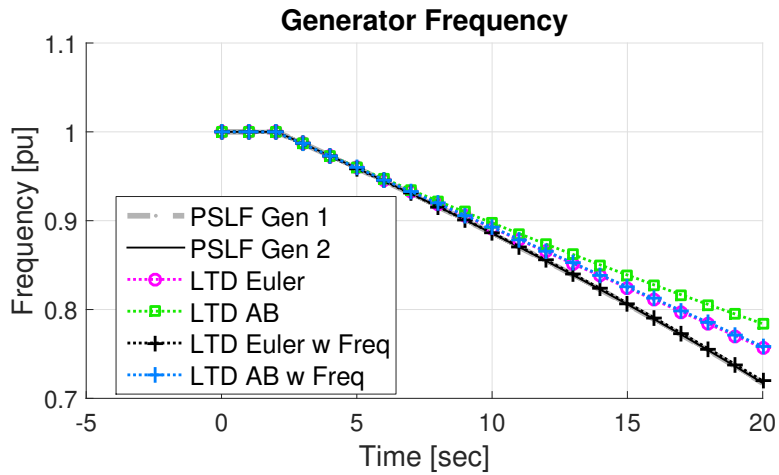
EE554.sav test system:

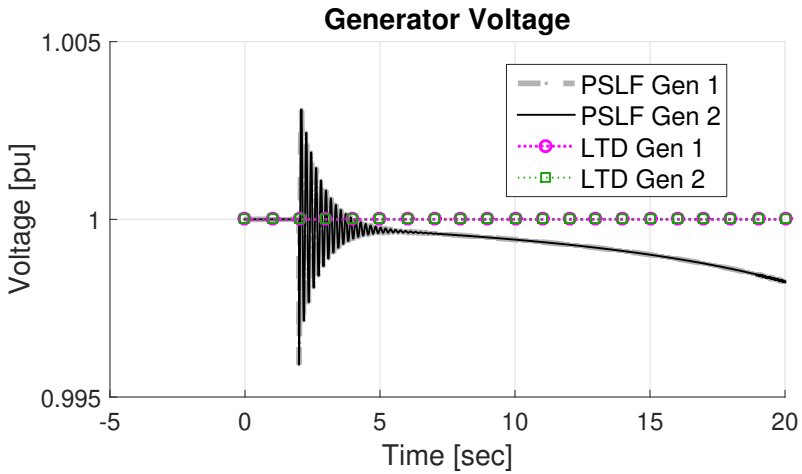


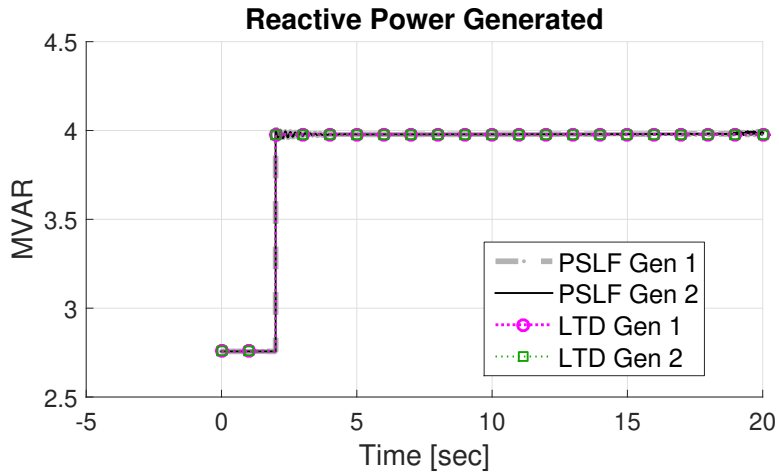
Generators are identical.
PSLF models have exciters.

System Response

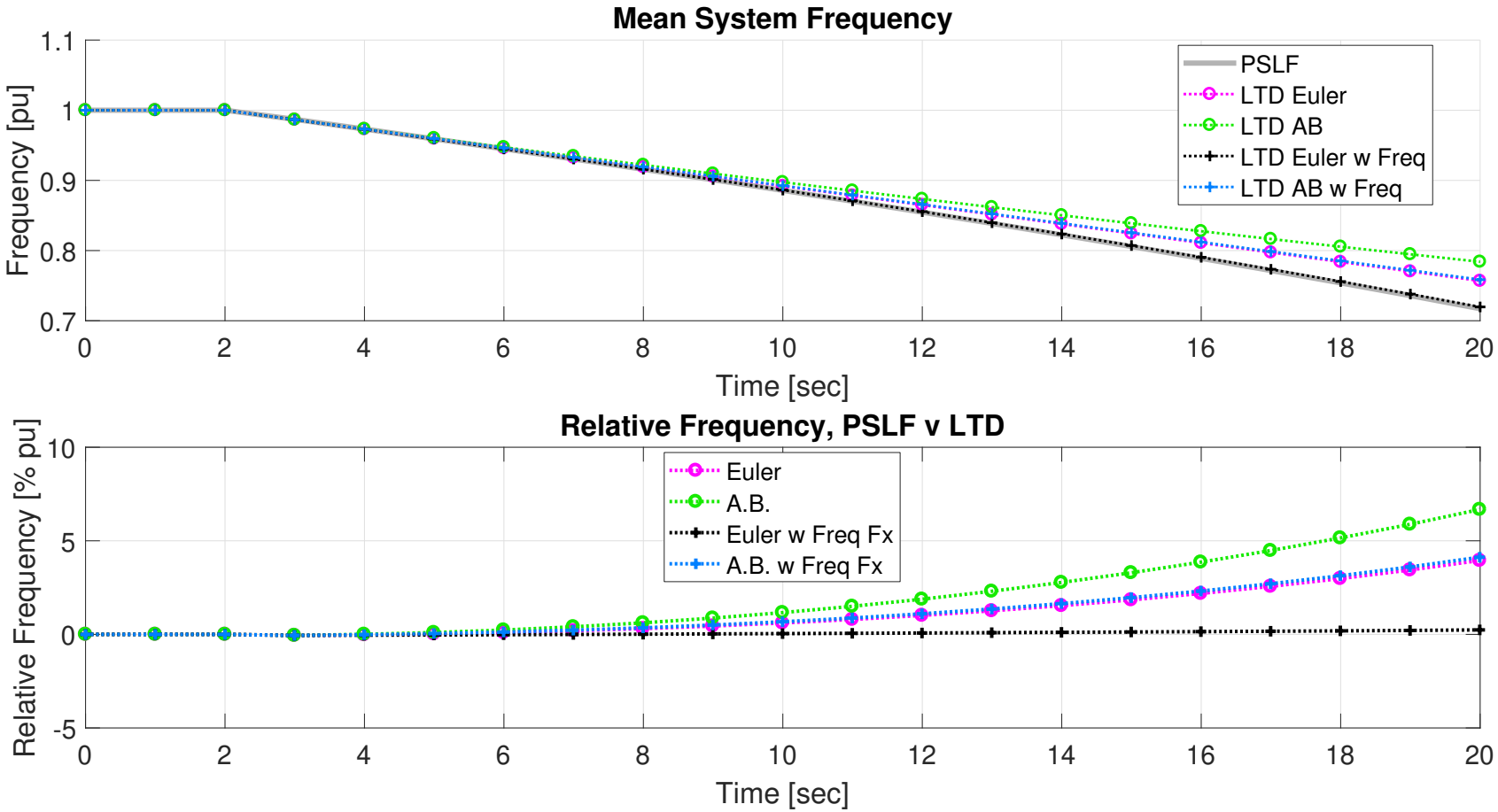




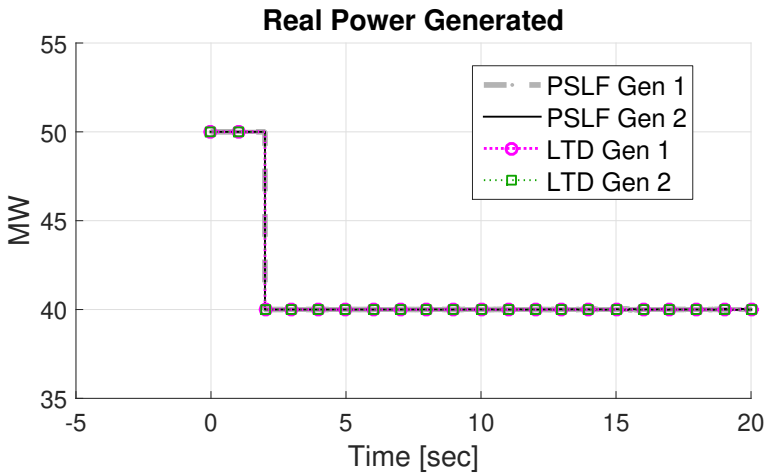


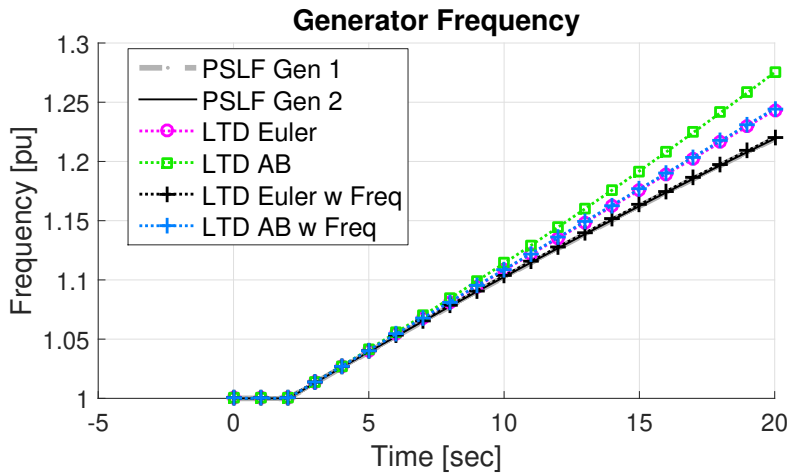


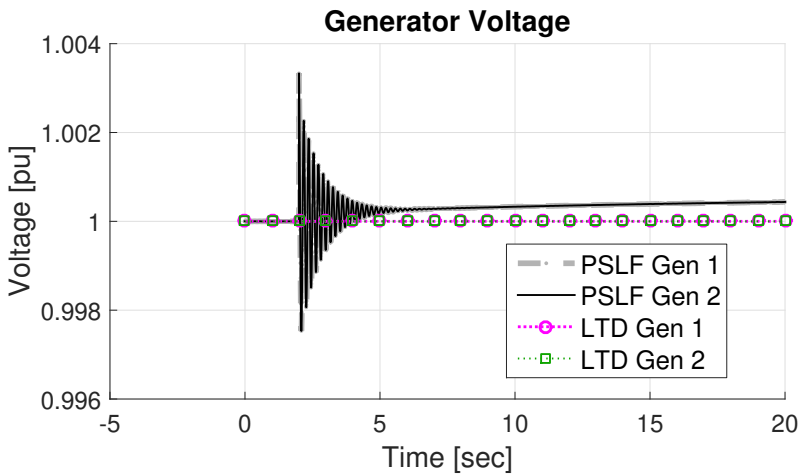
Detailed Frequency Response

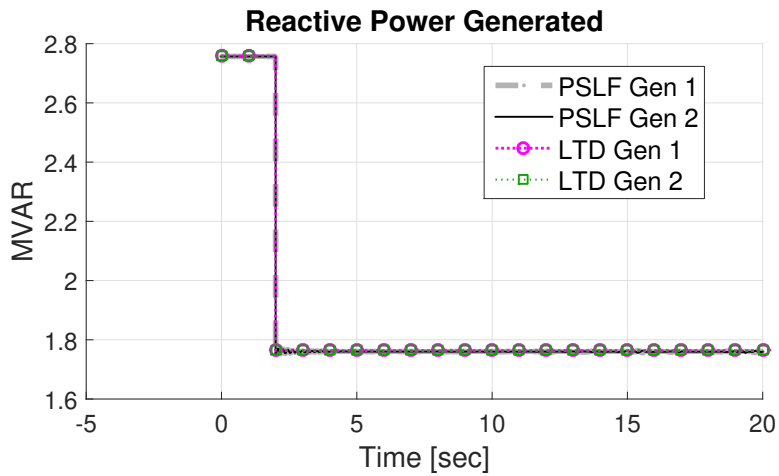


System Response

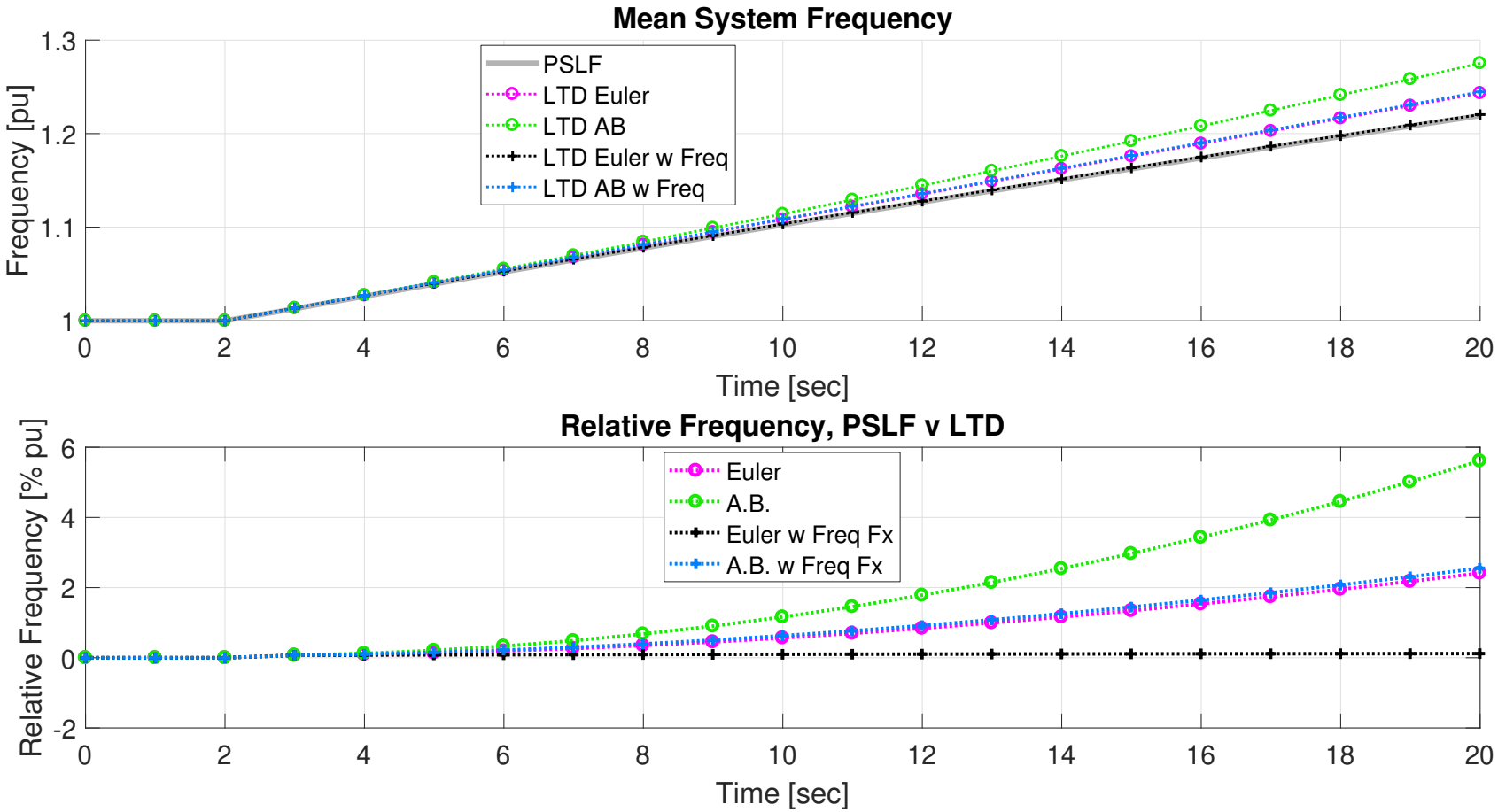




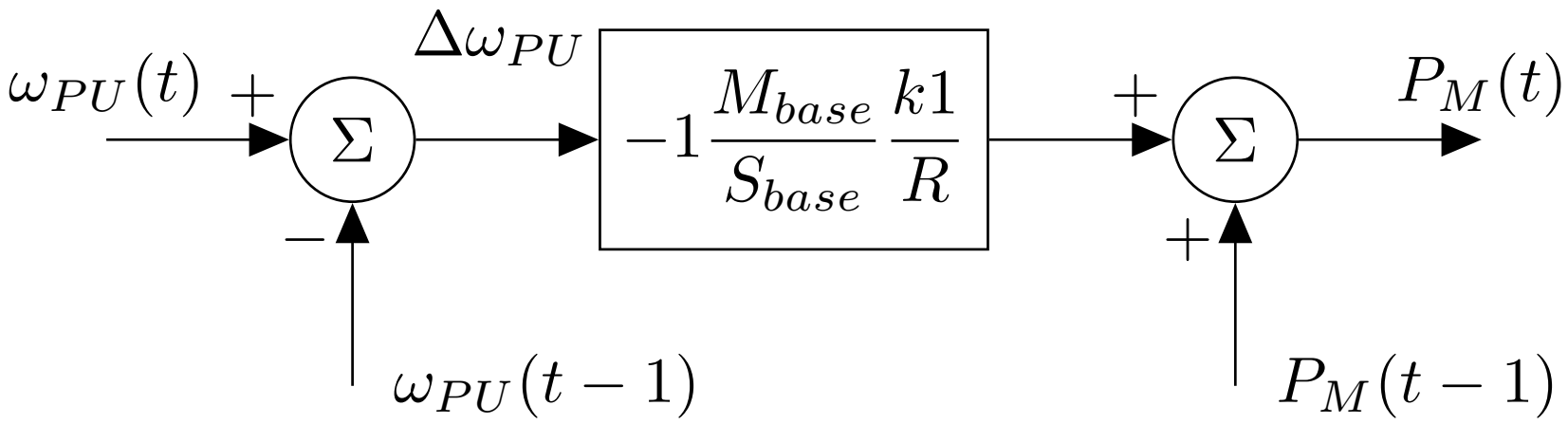




Detailed Frequency Response



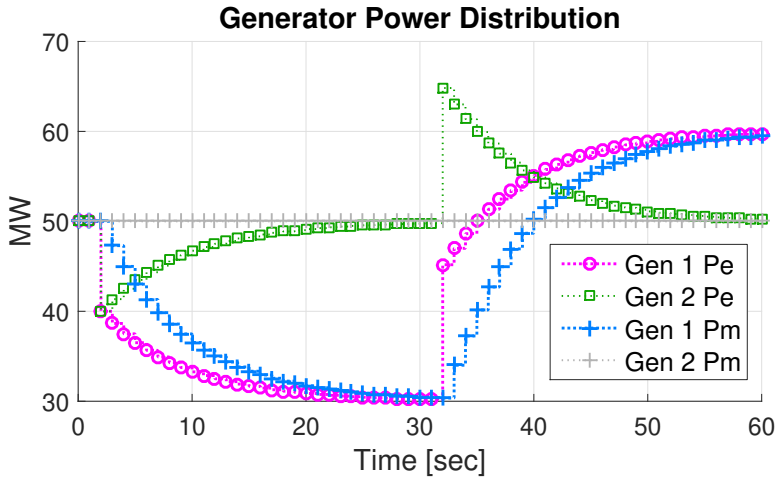
Proportional gain control of generator P_M

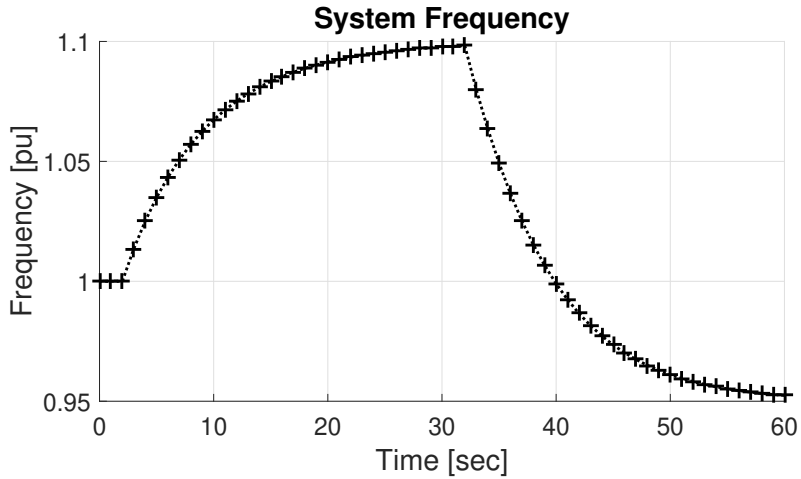


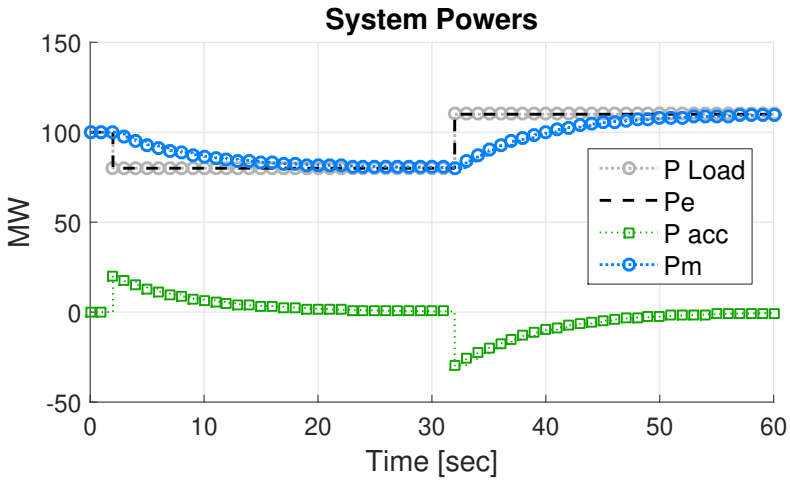
Entered into system via parsed text file:

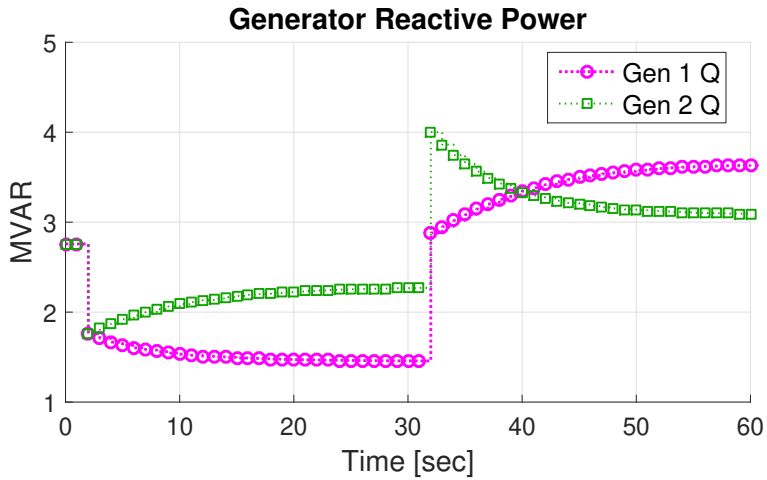
```
# pgov1   busnum busnam basekv id  : #9 mwcap droop  k1
#!pgov1    21 "21" 22.00 "1 " : #9 mwcap=100.0  0.05  13.0
```

pgov1 on Gen 1



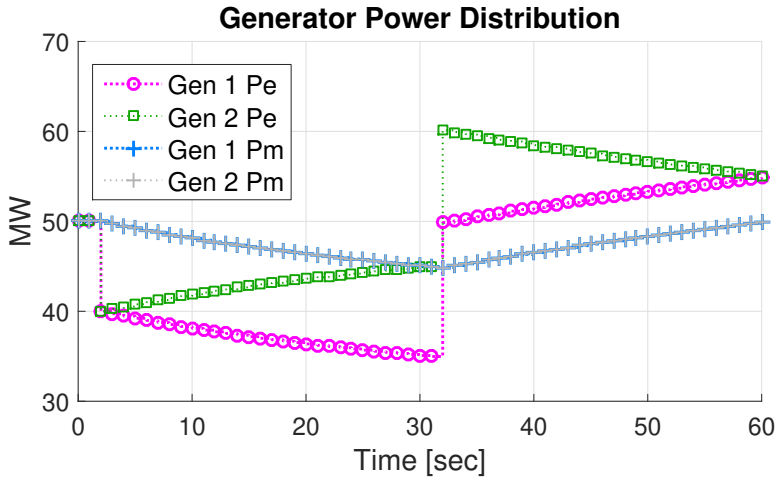


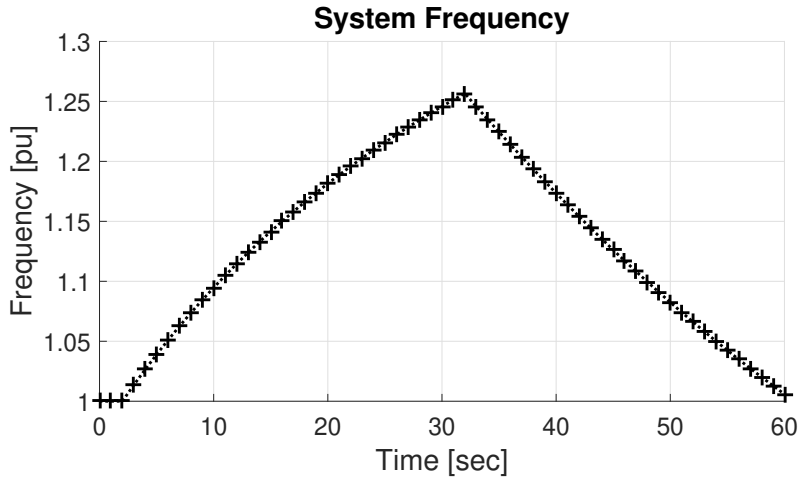


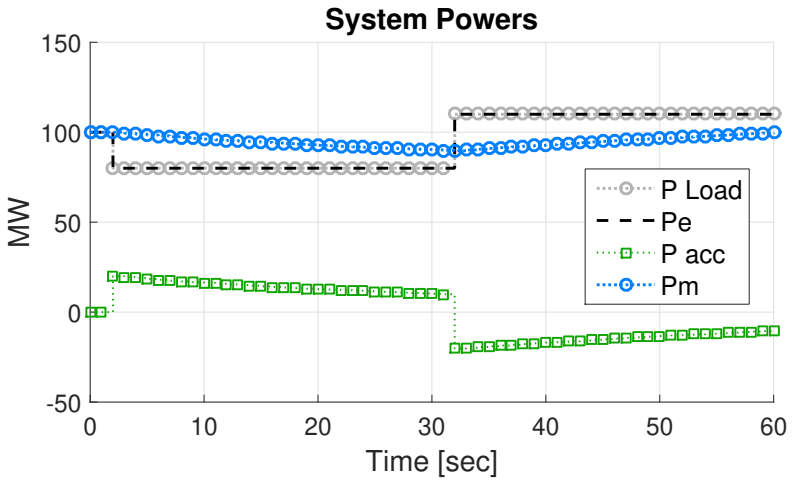


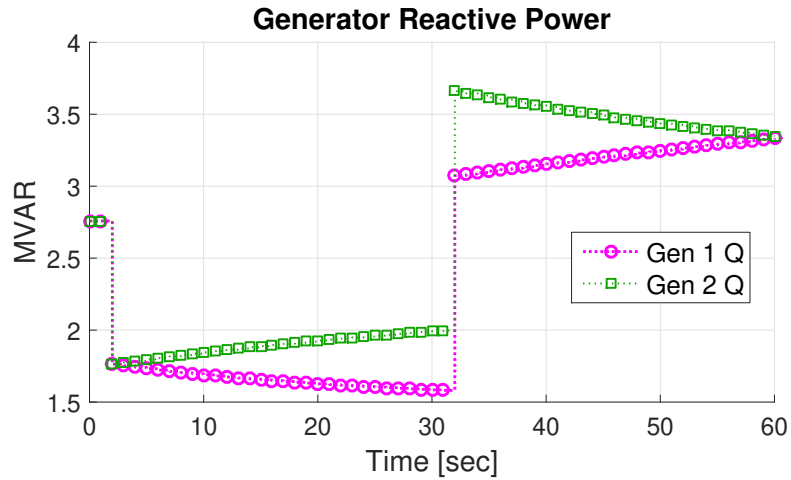
Dynamic model ’pgov1’ experiment: -20 MW t=2, +30 MW t=32

pgov1 on Gen 1 & Gen 2









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