Recent Progress:

1. **PSLF License Renewed**.
2. Balancing Authority ACE filtering expanded.
3. Six Machine Trip Testing.
4. MiniWECC Step and Trip Testing.
5. GitHub updated: `https://github.com/thadhaines/`

Current Tasks:

1. Continue to Update Code flowchart to aid in further development.
2. Bring wind into simulation.
3. Work to incorporate Matt's *Suggested Use Cases* into simulation.
   - Add Shunt Group Agent
   - Work to Define Definite Time Controller user input
   - Continue to Refine BA ACE actions.

Current Questions:

1. Best way to trip generators on/off in PSDS?
2. Could improper tripping cause non-convergence?
3. Could exciters be responsible for initial voltage differences in MiniWECC tests?
4. What is the end goal of this research?

   Long-term simulation of governor and AGC interaction to wind ramps while controlling voltage stability via switched shunts.

   Simulation uses large time steps, ignores inter-machine oscillations, utilizes a time sequence of power flows for system bus states, a single aggregate swing equation for frequency, and reduces governor models to 2nd order. (?)

Future Tasks:

(a) Account for different types of loads (exponential load model)

(b) Formulate feasible plan of action for casting all WECC governors to LTD governors (tgov1). Something like:

i. Parse models of interest from dyd.
ii. Create dyd from parsed model.
iii. Automate a 'scaled' Pref step test for a one machine infinite bus in PSDS.
iv. Read and analyze output data
v. Generate/Calculate LTD equivalent model parameters from results (this will probably use MATLAB and `jfind`)
vi. Export custom dyd for LTD simulation. (PSDS would still use original the dyd, though *could* use modified dyd)

(c) Add import mirror / bypass mirror init sequence option to prevent repeated mirror creations.

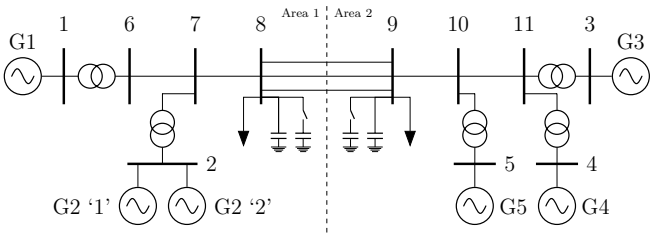
(d) Create an agent for every object: ULTC, SVD, Transformer, …

(e) Investigate line current data and ULTC action in PSDS.

Matt Requests:

(a) Enable multiple dyd files to overwrite / replace previously defined agents/parameters

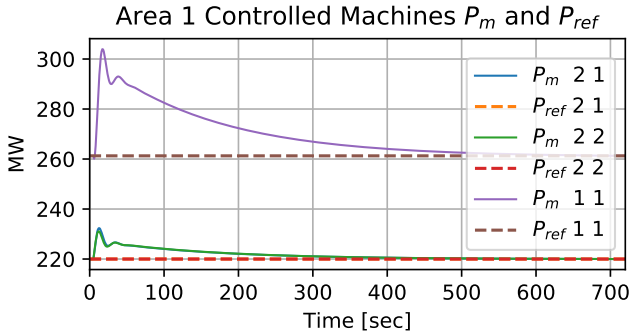
(b) Allow for variable time steps.

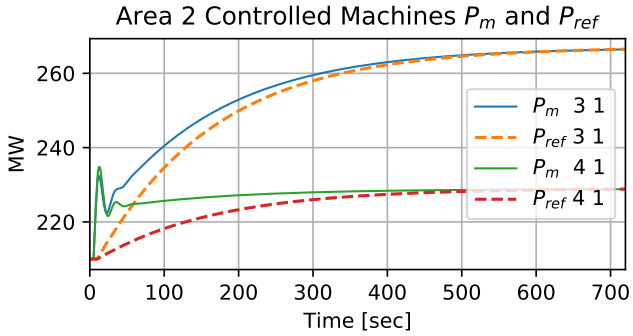


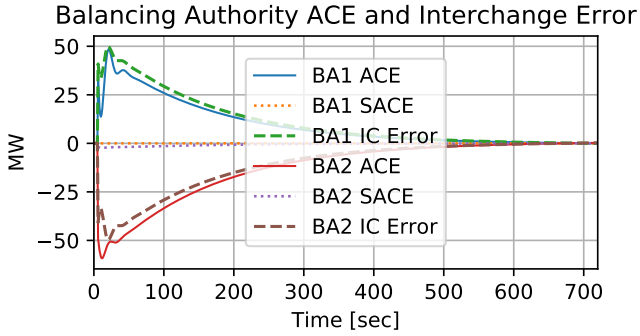
ACE Conventions: Positive ACE denotes over generation. B (the frequency bias) is negative.

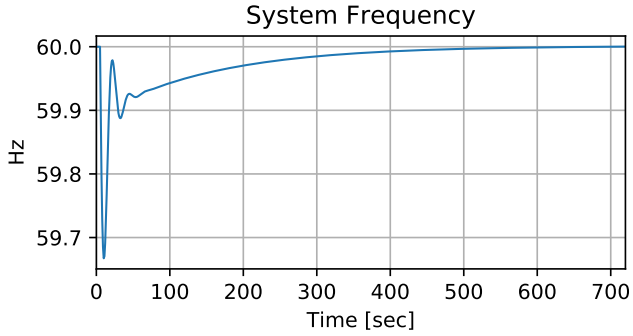
$$\begin{aligned} \text{ACE}_{\text{tie line}} &= P_{gen} - P_{load} - P_{\text{sched interchange}} \\ \text{ACE}_{\text{frequency bias}} &= 10B(f_{\text{actual}} - f_{\text{sched}})f_{base} \\ \text{ACE} &= \text{ACE}_{\text{tie line}} - \text{ACE}_{\text{frequency bias}} \end{aligned}$$

Final ACE Results: Event is a 75 MW load step in Area 2 of Six Machine System.

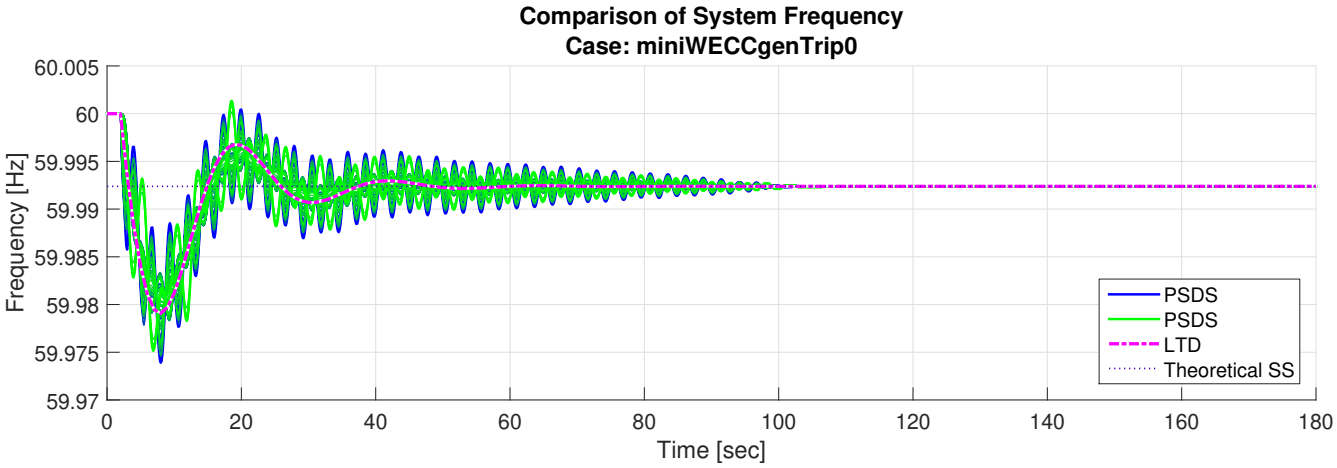








MiniWECC Gen Trip: Tripping Gen 27 (212.5 MW) at t=2.
Theoretical SS calculation requires tripped generator MW and change in system losses.



Tripping other generators (colstrip) causes Python run PSLF load flow solution to diverge.
The PSDS simulation does not crash during similar events.
The PSLF load flow does not diverge if the same generator is set to St=0 from PSLF.
Voltage magnitudes and angles from LTD do not match PSDS.