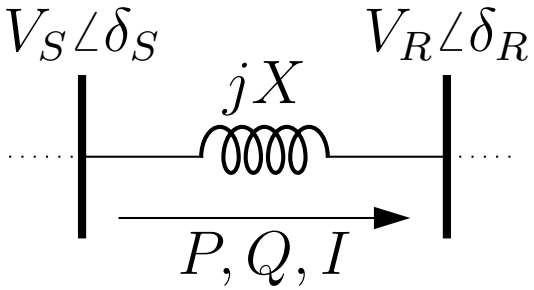
Recent Progress:

1. Branch Power Flow calculations added.



$$P = \frac{V_R V_S}{X}\sin(\delta_S - \delta_R) \quad (1)$$

$$Q = \frac{V_R}{X}\left(V_S\cos(\delta_S - \delta_R) - V_R\right) \quad (2)$$

$$I = \frac{|P + jQ|}{V_R\sqrt{3}} \quad (3)$$

   (Plots on reverse)
2. Generic Machine and Governors added and tested.
3. PSDS issues with voltage stability found when using: `hygov4`, `hyg3`, `hygov`, `ggov1`
4. dyd Parser updated to include MW capacity and percentages.
5. Initial generic miniWECC testing
6. GitHub updated: `https://github.com/thadhaines/`

Current Tasks:

1. Continue working with generics on miniWECC
2. Test WECC case...
3. 'Interesting' Case generation
4. Continue to refine BA ACE actions.
5. Update Code flowchart
6. Thesis work

Current Questions:

1. Progress on case data?
2. Calculation for VAR flow?
3. AMPS / sqrt(3) for Line to phase values-seems correct?
4. 'Security' issues associated with WECC data...

Future Tasks:

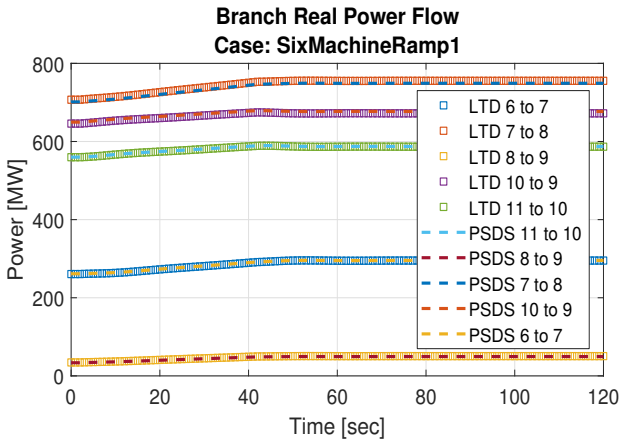
1. Add import mirror / bypass mirror init sequence option to prevent repeated mirror creations.
2. Bring wind into simulation (ramp ungoverned generators?)
3. Find best/correct way to trip gens in PSLF from python.

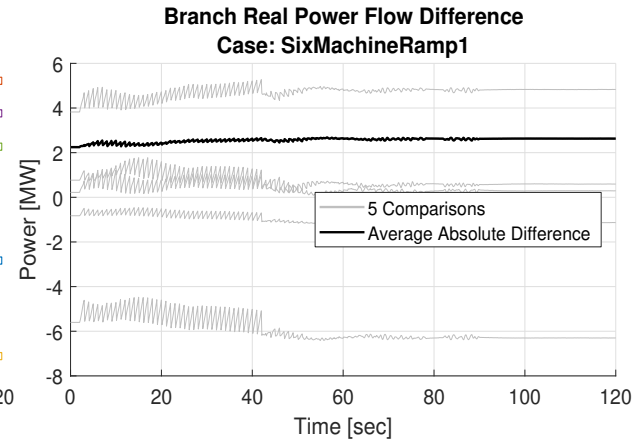
Future Work: (not by me)

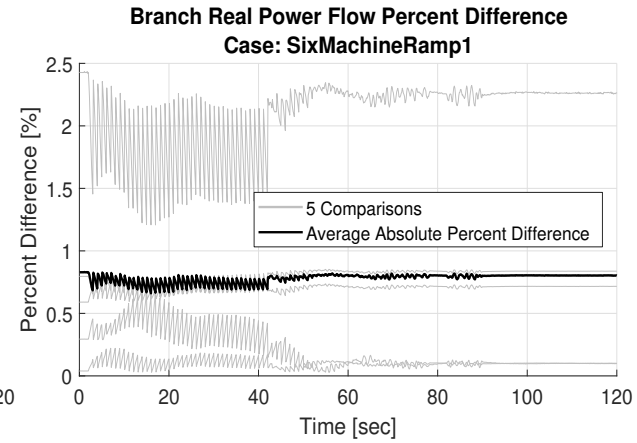
- Account for different types of loads. (exponential load model)
- Work to incorporate Matt's *Suggested Use Cases* into simulation.
  - Add Shunt Group Agent
  - Work to Define Definite Time Controller user input
- Investigate ULTC action.
- Create an agent for every object: ULTC, SVD, Transformer, …
- Move away from reliance on GE

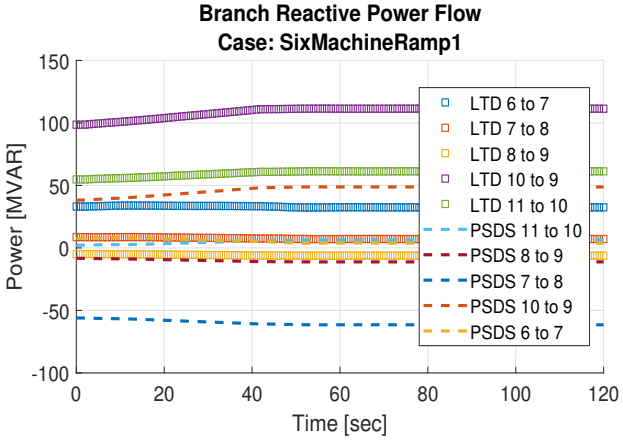
Matt Requests:

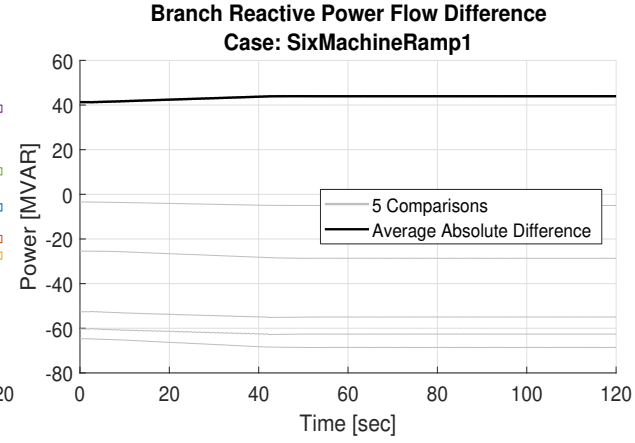
1. Enable multiple dyd files to overwrite / replace previously defined agents/parameters
2. Allow for variable time steps.

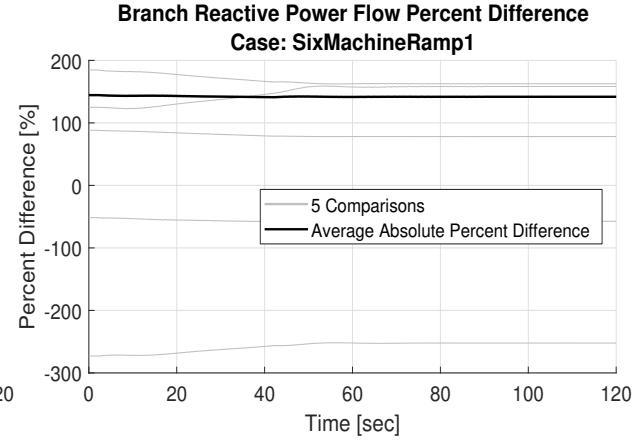

Branch Real Power Flow
Case: SixMachineRamp1
Power [MW]
Time [sec]
LTD 6 to 7
LTD 7 to 8
LTD 8 to 9
LTD 10 to 9
LTD 11 to 10
PSDS 11 to 10
PSDS 8 to 9
PSDS 7 to 8
PSDS 10 to 9
PSDS 6 to 7

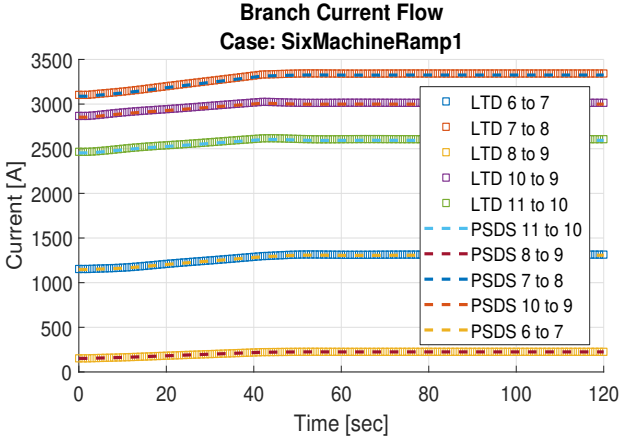

Branch Real Power Flow Difference
Case: SixMachineRamp1
Power [MW]
Time [sec]
5 Comparisons
Average Absolute Difference

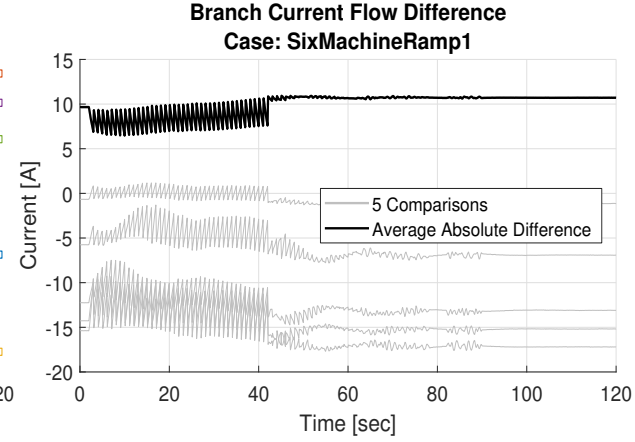

Branch Real Power Flow Percent Difference
Case: SixMachineRamp1
Percent Difference [%]
Time [sec]
5 Comparisons
Average Absolute Percent Difference

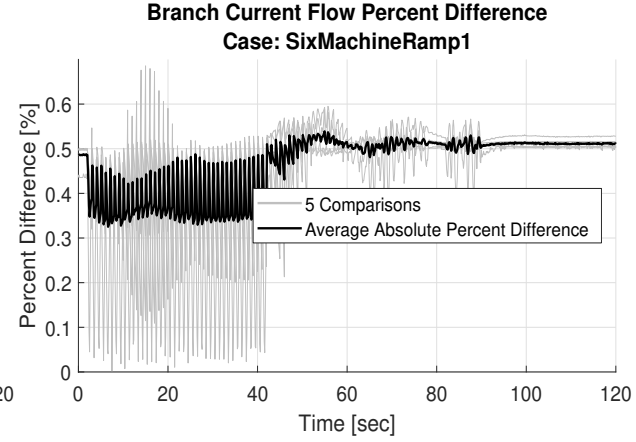

Branch Reactive Power Flow
Case: SixMachineRamp1
Power [MVAR]
Time [sec]
LTD 6 to 7
LTD 7 to 8
LTD 8 to 9
LTD 10 to 9
LTD 11 to 10
PSDS 11 to 10
PSDS 8 to 9
PSDS 7 to 8
PSDS 10 to 9
PSDS 6 to 7


Branch Reactive Power Flow Difference
Case: SixMachineRamp1
Power [MVAR]
Time [sec]
5 Comparisons
Average Absolute Difference


Branch Reactive Power Flow Percent Difference
Case: SixMachineRamp1
Percent Difference [%]
Time [sec]
5 Comparisons
Average Absolute Percent Difference


Branch Current Flow
Case: SixMachineRamp1
Current [A]
Time [sec]
LTD 6 to 7
LTD 7 to 8
LTD 8 to 9
LTD 10 to 9
LTD 11 to 10
PSDS 11 to 10
PSDS 8 to 9
PSDS 7 to 8
PSDS 10 to 9
PSDS 6 to 7


Branch Current Flow Difference
Case: SixMachineRamp1
Current [A]
Time [sec]
5 Comparisons
Average Absolute Difference


Branch Current Flow Percent Difference
Case: SixMachineRamp1
Percent Difference [%]
Time [sec]
5 Comparisons
Average Absolute Percent Difference

Parsing Results from 2018 WECC case:

Table 1: Machine parsing results.

Model Name	Occurrences	MVA Rating	% Of Models	% Of Capacity
genrou	1,823.00	203,122.05	43.05	54.65
gentpj	1,681.00	117,049.60	39.69	31.49
gentpf	587.00	34,533.84	13.86	9.29
gencc	48.00	9,790.80	1.13	2.63
gewtg	52.00	5,528.30	1.23	1.49
genwri	7.00	839.21	0.17	0.23
motor1	37.00	805.46	0.87	0.22
TOTAL	4,235.00	371,669.26	100.00	100.00

Table 2: Prime movers parsing results.

Model Name	Occurrences	MW Cap	% Of Models	% Of Capacity
ggov1	1,315.00	77,961.96	46.06	39.86
ieeeg1	300.00	54,452.11	10.51	27.84
hyg3	320.00	18,947.77	11.21	9.69
hygov4	167.00	7,614.40	5.85	3.89
ieeeg3	137.00	7,403.49	4.80	3.79
hygovr	25.00	6,249.37	0.88	3.20
ggov3	30.00	5,358.32	1.05	2.74
hygov	230.00	5,315.83	8.06	2.72
pidgov	61.00	3,809.77	2.14	1.95
wndtge	33.00	3,783.47	1.16	1.93
gpwscc	62.00	2,398.05	2.17	1.23
tgov1	25.00	1,485.56	0.88	0.76
g2wscc	21.00	458.28	0.74	0.23
gast	37.00	330.68	1.30	0.17
ccbt1	3.00	32.53	0.11	0.02
wndtrb	1.00	0.00	0.04	0.00
lcfb1	88.00	0.00	3.08	0.00
TOTAL	2,855.00	195,601.58	100.00	100.00

Table 3: Wind turbine parsing results.

Model Name	Occurrences	MW Cap	% Of Models	% Of Capacity
regc_a	286.00	18,461.70	19.54	40.29
wt4g	131.00	8,995.08	8.95	19.63
wt3g	112.00	7,633.72	7.65	16.66
wt3e	106.00	4,882.04	7.24	10.65
wt2g	21.00	1,841.24	1.43	4.02
wt2t	19.00	1,224.90	1.30	2.67
wt1g	21.00	1,188.37	1.43	2.59
wt1t	21.00	885.99	1.43	1.93
wt3t	106.00	712.28	7.24	1.55
wtgt_a	35.00	0.00	2.39	0.00
wtgq_a	29.00	0.00	1.98	0.00
wtgp_a	29.00	0.00	1.98	0.00
wtga_a	28.00	0.00	1.91	0.00
wt4t	72.00	0.00	4.92	0.00
wt3p	67.00	0.00	4.58	0.00
wt2p	16.00	0.00	1.09	0.00
wt2e	19.00	0.00	1.30	0.00
wt1p	16.00	0.00	1.09	0.00
repc_a	143.00	0.00	9.77	0.00
reec_a	44.00	0.00	3.01	0.00
exwtg1	5.00	0.00	0.34	0.00
ewtgfc	10.00	0.00	0.68	0.00
TOTAL	1,464.00	45,825.31	100.00	100.00