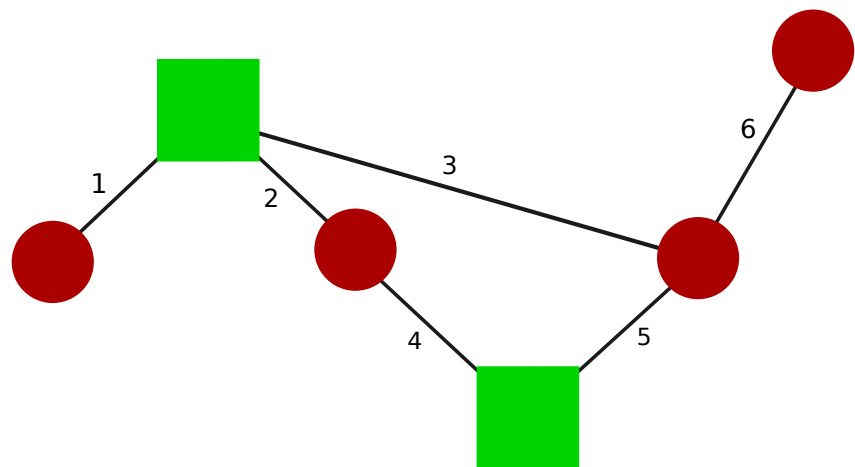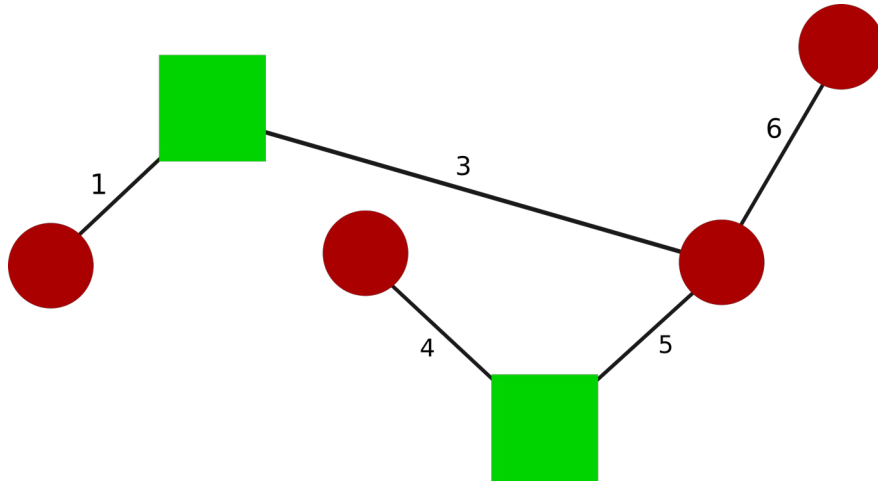# Objective

- We will look at three networks and cut different lines to see the peak power error and peak time error.

Methods

- Plotted the linear and non linear power of a line to calculate the peak power, peak time, and steady state error.

- Formula used for percent error: $\frac{Actual\,Value - Expected\,Value}{Expected\,Value} * 100$

Network 1

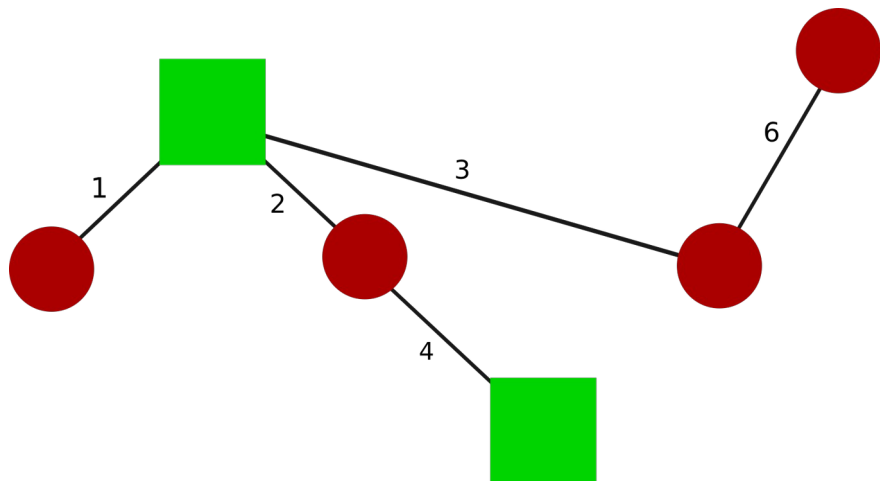| Setup 1 K70 Line 2			
Line	Power error	Time error	Steady state error
Line 1	1.70%		1.20%
Line 2	N/A	N/A	N/A
Line 3	1.34%	0.19%	1.35%
Line 4	2.24%	0.12%	2.12%
Line 5	0.49%	0.20%	0.73%
Line 6	0.78%	0.19%	0.40%

Setup 1 k140 Line2			
Line	Power error	Time error	Steady state error
Line 1	0.44%	0.00%	0.35%
Line 2	N/A	N/A	N/A
Line 3	0.42%	0.06%	0.35%
Line 4	0.70%	0.06%	0.35%
Line 5	0.25%	0.06%	0.20%
Line 6	0.15%	0.07%	0.09%

Setup 1 k70 Line 5			
Line	Power error	Time error	Steady state e
Line 1	1.14%	0.13%	1.35%
Line 2	2.12%	0.20%	0.73%
Line 3	6.32%	0.19%	4.11%
Line 4	5.94%	0.19%	5.35%
Line 5	N/A	N/A	N/A
Line 6	-3.19%	0.13%	0.34%

Setup 1 k140 Line 5			
Line	Power error	Time error	Steady state error
Line 1	0.16%	0.07%	0.35%
Line 2	0.58%	0.65%	0.20%
Line 3	1.90%	0.07%	1.06%
Line 4	2.25%	0.13%	1.35%
Line 5	N/A	N/A	N/A
Line 6	0.45%	0.07%	0.10%

Network 2
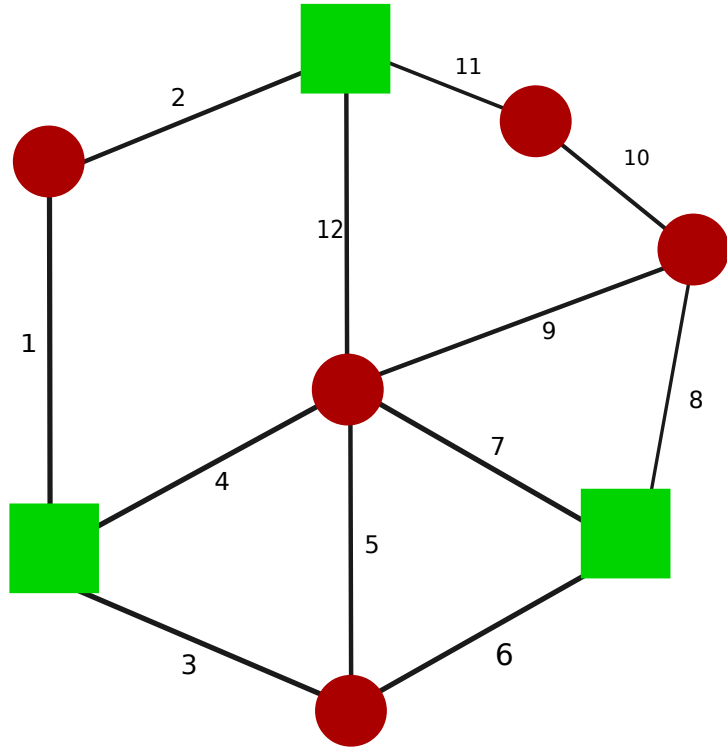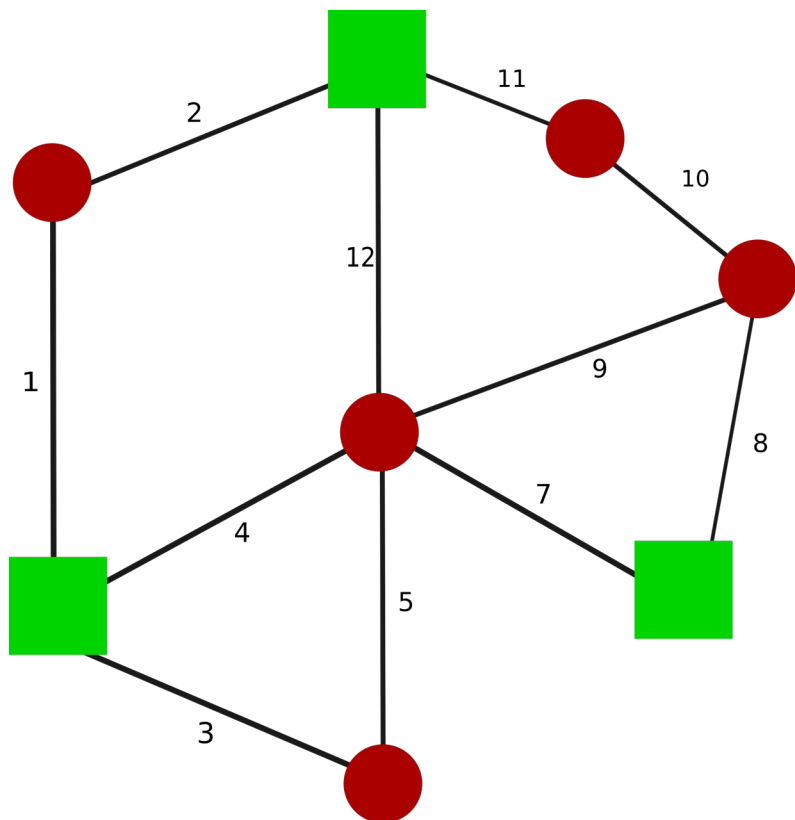
Setup 2 k70 Line6			
Line	Power error	Time error	Steady state error
Line 1	0.89%	0.07%	N/A
Line 2	1.02%	0.07%	N/A
Line 3	1.35%	0.07%	N/A
Line 4	2.30%	0.26%	N/A
Line 5	0.55%	0.13%	N/A
Line 6	N/A	N/A	N/A
Line 7	3.16%	0.13%	N/A
Line 8	2.12%	0.07%	N/A
Line 9	0.00%	0.07%	N/A
Line 10	-4.77%	0.13%	N/A
Line 11	-0.53%	0.13%	N/A
Line 12	0.00%	0.00%	N/A

Setup 2 k140 Line6			
Line	Power error	Time error	Steady state error
Line 1	-0.06%	0.00%	N/A
Line 2	1.72%	0.00%	N/A
Line 3	0.52%	0.07%	N/A
Line 4	14.63%	0.00%	N/A
Line 5	3.38%	0.13%	N/A
Line 6	N/A	N/A	N/A
Line 7	-1.14%	0.00%	N/A
Line 8	0.71%	0.07%	N/A
Line 9	-0.18%	0.07%	N/A
Line 10	-1.61%	0.66%	N/A
Line 11	5.83%	0.00%	N/A
Line 12	0.00%	0.00%	N/A
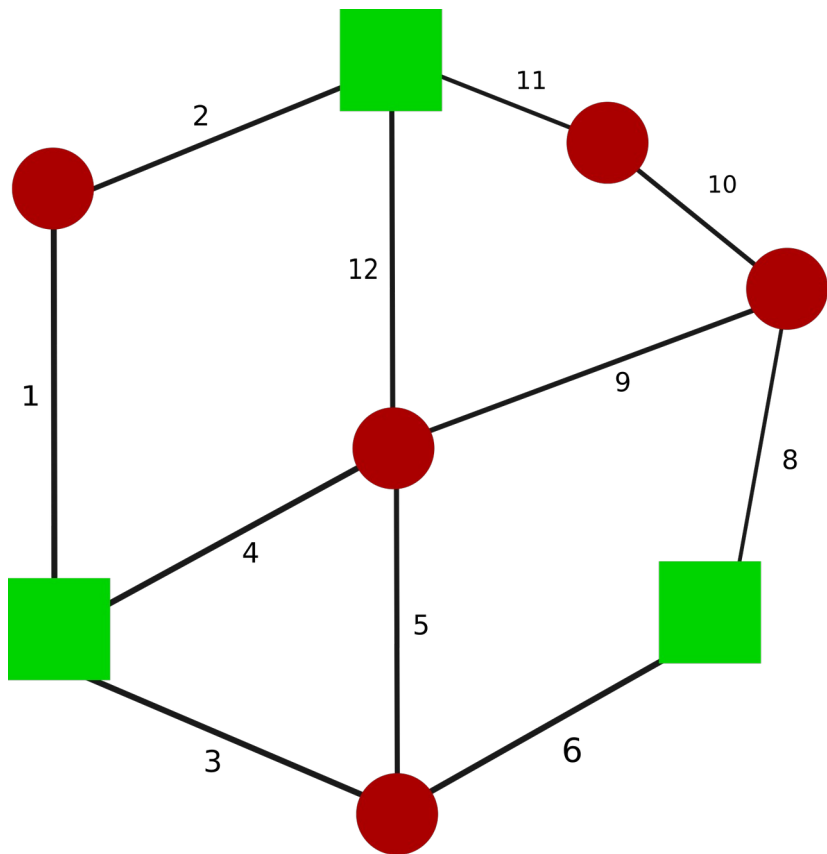
Setup 2 k70 Line7			
Line	Power error	Time error	Steady state error
Line 1	0.10%	0.66%	N/A
Line 2	0.15%	0.13%	N/A
Line 3	0.47%	0.06%	N/A
Line 4	0.47%	0.66%	N/A
Line 5	-2.70%	0.13%	N/A
Line 6	2.76%	0.07%	N/A
Line 7	N/A	N/A	N/A
Line 8	2.24%	0.07%	N/A
Line 9	-1.67%	0.13%	N/A
Line 10	0.47%	0.13%	N/A
Line 11	1.57%	0.13%	N/A
Line 12	1.33%	0.13%	N/A

Setup 2 k140 Line7			
Line	Power error	Time error	Steady state error
Line 1	2.37%	0.00%	N/A
Line 2	3.42%	0.07%	N/A
Line 3	-1.63%	0.07%	N/A
Line 4	3.79%	0.00%	N/A
Line 5	7.08%	0.06%	N/A
Line 6	1.50%	0.07%	N/A
Line 7	N/A	N/A	N/A
Line 8	1.20%	0.00%	N/A
Line 9	5.54%	0.00%	N/A
Line 10	1.84%	0.07%	N/A
Line 11	4.34%	0.07%	N/A
Line 12	2.81%	0.07%	N/A

Network 3
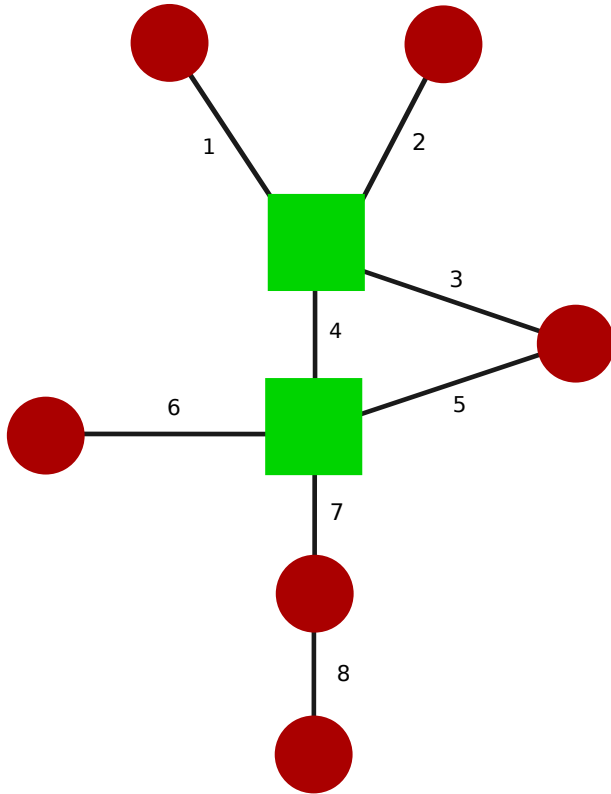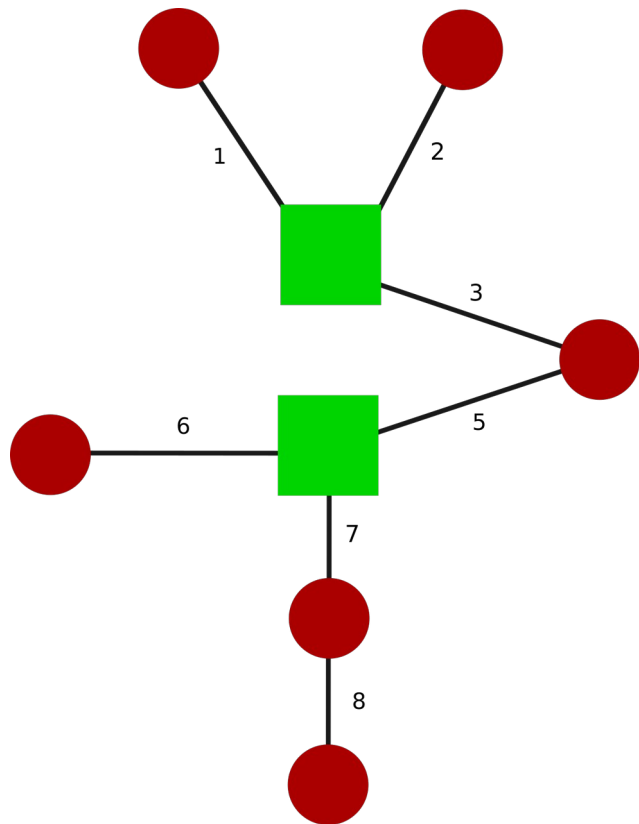
Setup 3 k70 Line4			
Line	Power error	Time error	Steady state error
Line 1	0.68%	-0.07%	0.34%
Line 2	0.68%	-0.07%	0.33%
Line 3	-1.68%	0.06%	3.03%
Line 4	N/A	N/A	N/A
Line 5	1.01%	0.00%	1.35%
Line 6	1.12%	0.00%	0.80%
Line 7	1.98%	0.00%	2.12%
Line 8	0.50%	0.00%	0.34%

Setup 3 k140 Line4			
Line	Power error	Time error	Steady state error
Line 1	0.45%	0.00%	0.09%
Line 2	0.04%	0.00%	0.09%
Line 3	1.06%	0.00%	0.77%
Line 4	N/A	N/A	N/A
Line 5	0.28%	-0.07%	0.35%
Line 6	0.33%	-0.07%	0.20%
Line 7	0.83%	0.00%	0.09%
Line 8	0.00%	-0.07%	0.09%
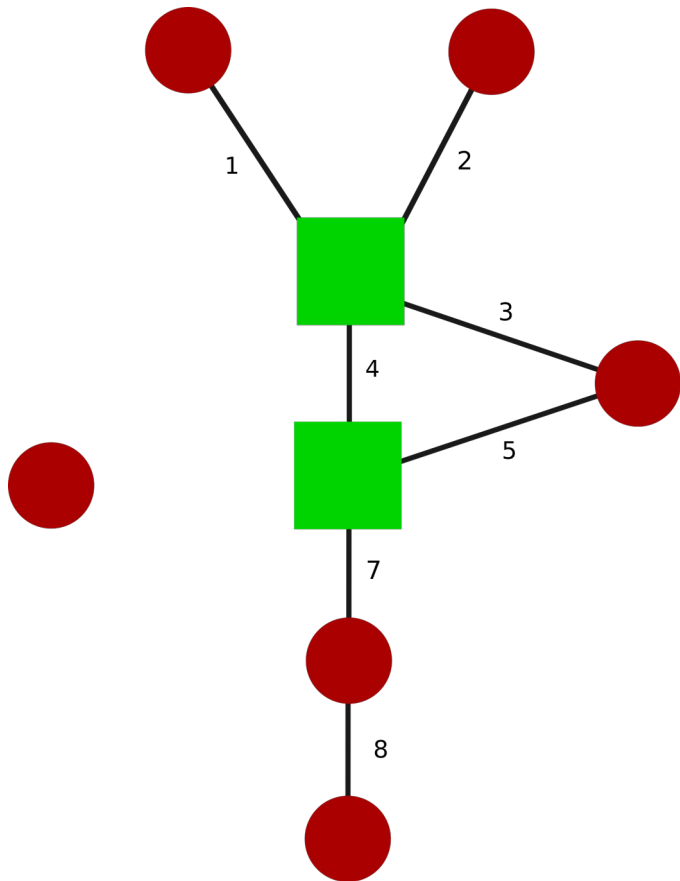
Setup 3 k70 Line 6			
Line	Power error	Time error	Steady state error
Line 1	1.15%	0.00%	N/A
Line 2	0.60%	0.00%	N/A
Line 3	1.50%	-0.06%	N/A
Line 4	2.01%	0.00%	N/A
Line 5	-3.27%	-0.06%	N/A
Line 6	N/A	N/A	N/A
Line 7	2.71%	-0.06%	N/A
Line 8	-0.32%	0.00%	N/A

Setup 3 k140 Line 6			
Line	Power error	Time error	Steady state error
Line 1	0.13%	0.00%	N/A
Line 2	-0.45%	-0.07%	N/A
Line 3	0.38%	0.00%	N/A
Line 4	0.14%	0.00%	N/A
Line 5	-1.94%	-0.07%	N/A
Line 6	N/A	N/A	N/A
Line 7	0.67%	0.00%	N/A
Line 8	0.13%	0.00%	N/A
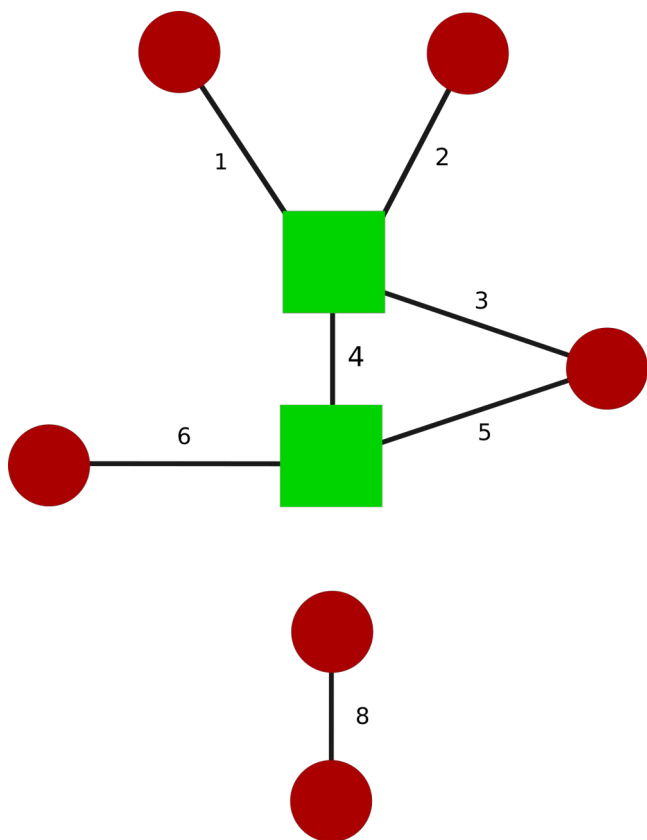
Setup 3 k70 Line7

Line	Power error	Time error	Steady state error
Line 1	1.17%	0.00%	N/A
Line 2	1.17%	0.26%	N/A
Line 3	1.04%	0.00%	N/A
Line 4	0.10%	0.00%	N/A
Line 5	1.43%	-0.07%	N/A
Line 6	1.91%	0.00%	N/A
Line 7	N/A	N/A	N/A
Line 8	-0.15%	0.00%	N/A

Setup 3 k140 Line7

Line	Power error	Time error	Steady state error
Line 1	0.33%	0.00%	N/A
Line 2	0.33%	0.00%	N/A
Line 3	0.27%	-0.07%	N/A
Line 4	0.17%	0.00%	N/A
Line 5	-0.34%	0.00%	N/A
Line 6	0.82%	1.42%	N/A
Line 7	N/A	N/A	N/A
Line 8	0.00%	0.00%	N/A

Example of Undefined steady state
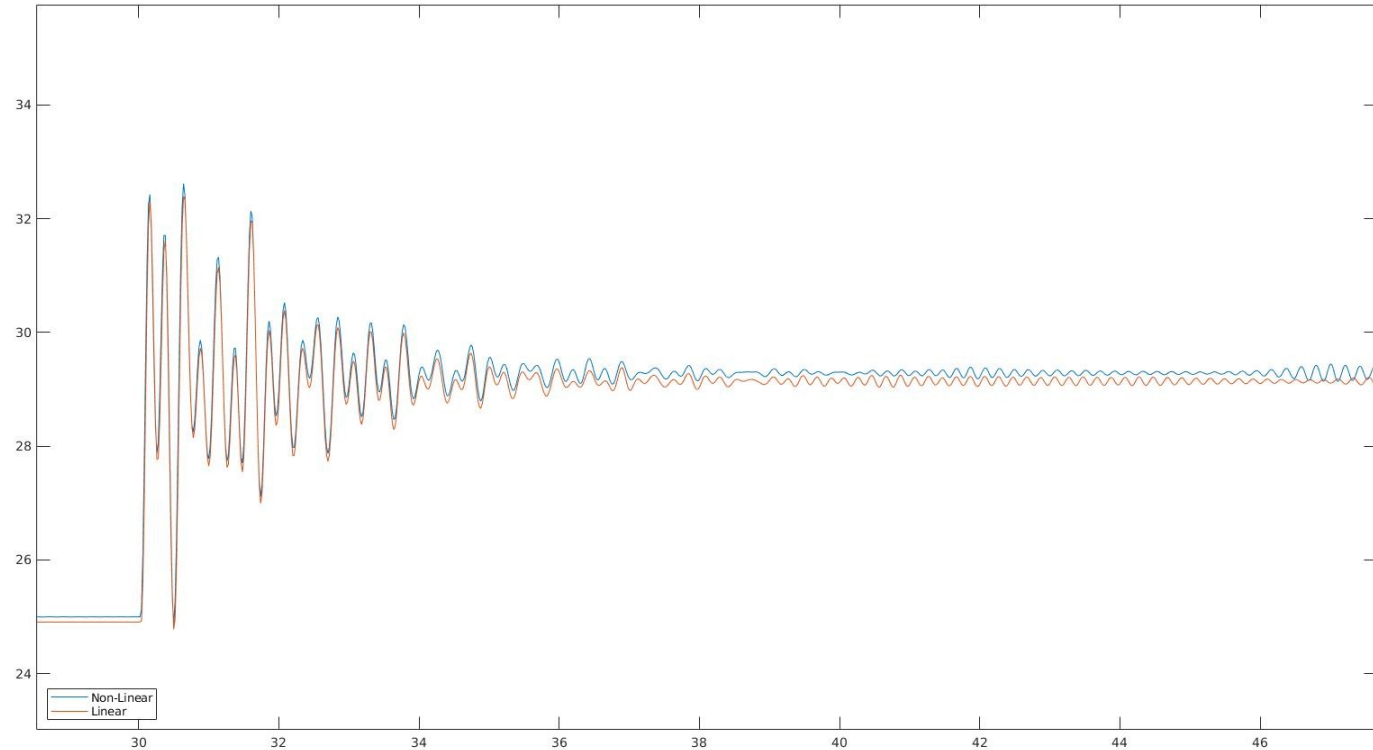
Findings

- Peak time error is usually less then 1%.

- Peak power error usually can get in the 1 -5 percent error range.