EE 521 Power System Analysis and EE 523 Power System Stability and Control Algorithms

Preamble and Control Inputs

```
systemName =
"ieee11"

powerFlowMethod =
"Fast Decoupled NRPF"
```

Read CDF file and store the data in neat MATLAB `tables: busData` and `branchData`.

`busData = 11×18 table`

	bus	busName	loadFlowArea	lossZone	busType	vFinal
1	1	"Bus 1 HV"	1	1	3	1.0300
2	2	"Bus 2 HV"	1	1	2	1.0100
3	3	"Bus 3 HV"	2	1	2	1.0300
4	4	"Bus 4 HV"	2	1	2	1.0100
5	5	"Bus 5 HV"	1	1	0	1.0060
6	6	"Bus 6 LV"	1	1	0	0.9780
7	7	"Bus 7 ZV"	1	1	0	0.9610
8	8	"Bus 8 TV"	3	1	0	0.9490
9	9	"Bus 9 LV"	2	1	0	0.9710
10	10	"Bus 10 LV"	2	1	0	0.9840
11	11	"Bus 11 LV"	2	1	0	1.0080

`branchData = 10×15 table`

	i	j	loadFlowArea	lossZone	ckt	type	R
1	1	5	1	1	1	0	0
2	2	6	1	1	1	0	0
3	3	11	2	1	1	0	0
4	4	10	2	1	1	0	0
5	5	6	1	1	1	0	0.0025
6	6	7	1	1	1	0	0.0010
7	7	8	1	1	1	0	0.0055
8	8	9	2	1	1	0	0.0055
9	9	10	2	1	1	0	0.0010
10	10	11	2	1	1	0	0.0025

```
N = 11
numBranch = 10
```

Extract Y_{Bus}, Adjacency List E from the `branchData table`.

```
ybusTable = 11×11 table
```

...

	1	2	3	4	5
1 1	0.0000 -59.9880i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 +59.9880i
2 2	0.0000 + 0.0000i	0.0000 -59.9880i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
3 3	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 -59.9880i	0.0000 + 0.0000i	0.0000 + 0.0000i
4 4	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 -59.9880i	0.0000 + 0.0000i
5 5	0.0000 +59.9880i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	3.9604 -99.5701i
6 6	0.0000 + 0.0000i	0.0000 +59.9880i	0.0000 + 0.0000i	0.0000 + 0.0000i	-3.9604 +39.6040i
7 7	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
8 8	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
9 9	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
10 10	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 +59.9880i	0.0000 + 0.0000i
11 11	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 +59.9880i	0.0000 + 0.0000i	0.0000 + 0.0000i

Run Newton Raphson Power Flow and obtain a steady state snapshot of the system variables $P_i, Q_i, V_i, \delta_i \ \forall$ buses $i \in [1, N], i \in \mathbb{N}$

```
Iteration Number 1 Jacobian J11:
J11Table = 10×10 table
```

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	60.5879	0	0	0	-60.5879	0
2 P_3	0	61.7876	0	0	0	0
3 P_4	0	0	60.5879	0	0	0
4 P_5	0	0	0	101.8314	-40	0
5 P_6	-60.5879	0	0	-40	200.6491	-100
6 P_7	0	0	0	0	-100	122.5843
7 P_8	0	0	0	0	0	-18.1818
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-60.5879	0	0	0
10 P_11	0	-61.7876	0	0	0	0

```
Iteration Number 1 Jacobians:
J22Table = 7×7 table
```

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	98.0700	2.6691	0	0
2 Q_6	-2.6691	199.6509	9.6758	0
3 Q_7	0	-9.6758	119.5336	0.9156
4 Q_8	0	0	-0.9156	36.4006
5 Q_9	0	0	0	-1.1135
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

Iteration Number 2 Jacobian J11:
J11Table = 10×10 table

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	60.3141	0	0	0	-60.7189	0
2 P_3	0	62.3014	0	0	0	0
3 P_4	0	0	59.9979	0	0	0
4 P_5	0	0	0	104.0569	-40.8771	0
5 P_6	-60.7189	0	0	-40.8771	201.4831	-100.1002
6 P_7	0	0	0	0	-100.1002	121.4679
7 P_8	0	0	0	0	0	-18.3333
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-60.4006	0	0	0
10 P_11	0	-62.7256	0	0	0	0

Iteration Number 2 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	104.0890	5.2546	0	0
2 Q_6	-5.2546	200.7991	12.2541	0
3 Q_7	0	-12.2541	119.2798	2.8758
4 Q_8	0	0	-2.8758	37.8586
5 Q_9	0	0	0	-3.0141
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

Iteration Number 3 Jacobian J11:
J11Table = 10×10 table

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	60.3472	0	0	0	-60.7475	0

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
2 P_3	0	62.2490	0	0	0	0
3 P_4	0	0	60.2359	0	0	0
4 P_5	0	0	0	103.8189	-40.8578	0
5 P_6	-60.7475	0	0	-40.8578	200.9119	-100.0309
6 P_7	0	0	0	0	-100.0309	120.6333
7 P_8	0	0	0	0	0	-18.1160
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-60.6283	0	0	0
10 P_11	0	-62.6447	0	0	0	0

Iteration Number 3 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	103.9159	6.2959	0	0
2 Q_6	-6.2959	201.5133	13.2413	0
3 Q_7	0	-13.2413	119.2940	3.5434
4 Q_8	0	0	-3.5434	36.9668
5 Q_9	0	0	0	-3.5277
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

Iteration Number 4 Jacobian J11:
J11Table = 10×10 table

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	60.2266	0	0	0	-60.6285	0
2 P_3	0	62.3337	0	0	0	0
3 P_4	0	0	60.1280	0	0	0
4 P_5	0	0	0	103.4944	-40.7363	0
5 P_6	-60.6285	0	0	-40.7363	199.8126	-99.4471
6 P_7	0	0	0	0	-99.4471	119.5230
7 P_8	0	0	0	0	0	-17.8883
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-60.5275	0	0	0
10 P_11	0	-62.7432	0	0	0	0

Iteration Number 4 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	103.7460	6.6942	0	0
2 Q_6	-6.6942	200.8864	13.6182	0
3 Q_7	0	-13.6182	118.4077	3.8240
4 Q_8	0	0	-3.8240	36.2420
5 Q_9	0	0	0	-3.7792
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

Iteration Number 5 Jacobian J11:
J11Table = 10×10 table

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	60.0596	0	0	0	-60.4631	0
2 P_3	0	62.2855	0	0	0	0
3 P_4	0	0	60.0921	0	0	0
4 P_5	0	0	0	103.1760	-40.5700	0
5 P_6	-60.4631	0	0	-40.5700	198.6490	-98.7362
6 P_7	0	0	0	0	-98.7362	118.4582
7 P_8	0	0	0	0	0	-17.6965
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-60.4955	0	0	0
10 P_11	0	-62.6960	0	0	0	0

Iteration Number 5 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	103.4619	6.8323	0	0
2 Q_6	-6.8323	199.7971	13.7453	0
3 Q_7	0	-13.7453	117.2997	3.9255
4 Q_8	0	0	-3.9255	35.7639
5 Q_9	0	0	0	-3.8720
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

Iteration Number 6 Jacobian J11:
J11Table = 10×10 table

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	59.8900	0	0	0	-60.2951	0

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
2 P_3	0	62.2742	0	0	0	0
3 P_4	0	0	59.9676	0	0	0
4 P_5	0	0	0	102.8990	-40.4034	0
5 P_6	-60.2951	0	0	-40.4034	197.5940	-98.0666
6 P_7	0	0	0	0	-98.0666	117.5266
7 P_8	0	0	0	0	0	-17.5231
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-60.3720	0	0	0
10 P_11	0	-62.6867	0	0	0	0

Iteration Number 6 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	103.1740	6.8791	0	0
2 Q_6	-6.8791	198.6139	13.7861	0
3 Q_7	0	-13.7861	116.3147	3.9608
4 Q_8	0	0	-3.9608	35.2898
5 Q_9	0	0	0	-3.9109
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

Iteration Number 7 Jacobian J11:
J11Table = 10×10 table

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	59.7425	0	0	0	-60.1491	0
2 P_3	0	62.2192	0	0	0	0
3 P_4	0	0	59.8926	0	0	0
4 P_5	0	0	0	102.6631	-40.2560	0
5 P_6	-60.1491	0	0	-40.2560	196.6758	-97.4659
6 P_7	0	0	0	0	-97.4659	116.7314
7 P_8	0	0	0	0	0	-17.3876
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-60.2988	0	0	0
10 P_11	0	-62.6320	0	0	0	0

Iteration Number 7 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	102.8985	6.8979	0	0
2 Q_6	-6.8979	197.6053	13.7969	0
3 Q_7	0	-13.7969	115.3650	3.9776
4 Q_8	0	0	-3.9776	34.9996
5 Q_9	0	0	0	-3.9276
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

Iteration Number 8 Jacobian J11:
J11Table = 10×10 table

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	59.6076	0	0	0	-60.0154	0
2 P_3	0	62.1891	0	0	0	0
3 P_4	0	0	59.7921	0	0	0
4 P_5	0	0	0	102.4619	-40.1253	0
5 P_6	-60.0154	0	0	-40.1253	195.8881	-96.9574
6 P_7	0	0	0	0	-96.9574	116.0614
7 P_8	0	0	0	0	0	-17.2681
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-60.1988	0	0	0
10 P_11	0	-62.6027	0	0	0	0

Iteration Number 8 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	102.6754	6.9052	0	0
2 Q_6	-6.9052	196.6376	13.8012	0
3 Q_7	0	-13.8012	114.6379	3.9845
4 Q_8	0	0	-3.9845	34.6974
5 Q_9	0	0	0	-3.9375
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

Iteration Number 9 Jacobian J11:
J11Table = 10×10 table

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	59.4997	0	0	0	-59.9085	0

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
2 P_3	0	62.1453	0	0	0	0
3 P_4	0	0	59.7226	0	0	0
4 P_5	0	0	0	102.2901	-40.0162	0
5 P_6	-59.9085	0	0	-40.0162	195.2256	-96.5210
6 P_7	0	0	0	0	-96.5210	115.4918
7 P_8	0	0	0	0	0	-17.1705
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-60.1303	0	0	0
10 P_11	0	-62.5590	0	0	0	0

Iteration Number 9 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	102.4608	6.9105	0	0
2 Q_6	-6.9105	195.9012	13.8004	0
3 Q_7	0	-13.8004	113.9477	3.9901
4 Q_8	0	0	-3.9901	34.4887
5 Q_9	0	0	0	-3.9437
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

Iteration Number 10 Jacobian J11:
J11Table = 10×10 table

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	59.4016	0	0	0	-59.8112	0
2 P_3	0	62.1164	0	0	0	0
3 P_4	0	0	59.6469	0	0	0
4 P_5	0	0	0	102.1462	-39.9216	0
5 P_6	-59.8112	0	0	-39.9216	194.6586	-96.1542
6 P_7	0	0	0	0	-96.1542	115.0121
7 P_8	0	0	0	0	0	-17.0853
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-60.0550	0	0	0
10 P_11	0	-62.5306	0	0	0	0

Iteration Number 10 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	102.3009	6.9131	0	0
2 Q_6	-6.9131	195.1972	13.8011	0
3 Q_7	0	-13.8011	113.4258	3.9933
4 Q_8	0	0	-3.9933	34.2776
5 Q_9	0	0	0	-3.9488
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

```
Iteration Number 11 Jacobian J11:
J11Table = 10×10 table
```

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	59.3238	0	0	0	-59.7343	0
2 P_3	0	62.0836	0	0	0	0
3 P_4	0	0	59.5897	0	0	0
4 P_5	0	0	0	102.0226	-39.8431	0
5 P_6	-59.7343	0	0	-39.8431	194.1833	-95.8411
6 P_7	0	0	0	0	-95.8411	114.6027
7 P_8	0	0	0	0	0	-17.0138
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-59.9985	0	0	0
10 P_11	0	-62.4980	0	0	0	0

```
Iteration Number 11 Jacobians:
J22Table = 7×7 table
```

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	102.1454	6.9162	0	0
2 Q_6	-6.9162	194.6686	13.7997	0
3 Q_7	0	-13.7997	112.9327	3.9966
4 Q_8	0	0	-3.9966	34.1205
5 Q_9	0	0	0	-3.9527
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

```
Iteration Number 12 Jacobian J11:
J11Table = 10×10 table
```

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	59.2532	0	0	0	-59.6643	0

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
2 P_3	0	62.0596	0	0	0	0
3 P_4	0	0	59.5330	0	0	0
4 P_5	0	0	0	101.9194	-39.7752	0
5 P_6	-59.6643	0	0	-39.7752	193.7751	-95.5766
6 P_7	0	0	0	0	-95.5766	114.2564
7 P_8	0	0	0	0	0	-16.9519
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-59.9422	0	0	0
10 P_11	0	-62.4742	0	0	0	0

Iteration Number 12 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	102.0306	6.9180	0	0
2 Q_6	-6.9180	194.1650	13.8000	0
3 Q_7	0	-13.8000	112.5544	3.9988
4 Q_8	0	0	-3.9988	33.9683
5 Q_9	0	0	0	-3.9562
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

Iteration Number 13 Jacobian J11:
J11Table = 10×10 table

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	59.1968	0	0	0	-59.6084	0
2 P_3	0	62.0351	0	0	0	0
3 P_4	0	0	59.4878	0	0	0
4 P_5	0	0	0	101.8303	-39.7184	0
5 P_6	-59.6084	0	0	-39.7184	193.4316	-95.3506
6 P_7	0	0	0	0	-95.3506	113.9599
7 P_8	0	0	0	0	0	-16.8994
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-59.8975	0	0	0
10 P_11	0	-62.4499	0	0	0	0

Iteration Number 13 Jacobians:
J22Table = 7×7 table

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	101.9193	6.9201	0	0
2 Q_6	-6.9201	193.7815	13.7990	0
3 Q_7	0	-13.7990	112.2009	4.0011
4 Q_8	0	0	-4.0011	33.8496
5 Q_9	0	0	0	-3.9591
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

```
Iteration Number 14 Jacobian J11:
J11Table = 10×10 table
```

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	59.1458	0	0	0	-59.5579	0
2 P_3	0	62.0160	0	0	0	0
3 P_4	0	0	59.4451	0	0	0
4 P_5	0	0	0	101.7556	-39.6694	0
5 P_6	-59.5579	0	0	-39.6694	193.1358	-95.1586
6 P_7	0	0	0	0	-95.1586	113.7080
7 P_8	0	0	0	0	0	-16.8540
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-59.8552	0	0	0
10 P_11	0	-62.4310	0	0	0	0

```
Iteration Number 14 Jacobians:
J22Table = 7×7 table
```

...

	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	101.8359	6.9215	0	0
2 Q_6	-6.9215	193.4205	13.7991	0
3 Q_7	0	-13.7991	111.9240	4.0027
4 Q_8	0	0	-4.0027	33.7385
5 Q_9	0	0	0	-3.9616
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

```
Iteration Number 15 Jacobian J11:
J11Table = 10×10 table
```

...

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
1 P_2	59.1045	0	0	0	-59.5170	0

	$delta_2$	$delta_3$	$delta_4$	$delta_5$	$delta_6$	$delta_7$
2 P_3	0	61.9976	0	0	0	0
3 P_4	0	0	59.4101	0	0	0
4 P_5	0	0	0	101.6910	-39.6281	0
5 P_6	-59.5170	0	0	-39.6281	192.8858	-94.9943
6 P_7	0	0	0	0	-94.9943	113.4918
7 P_8	0	0	0	0	0	-16.8153
8 P_9	0	0	0	0	0	0
9 P_10	0	0	-59.8205	0	0	0
10 P_11	0	-62.4128	0	0	0	0

```
Iteration Number 15 Jacobians:
J22Table = 7×7 table
```

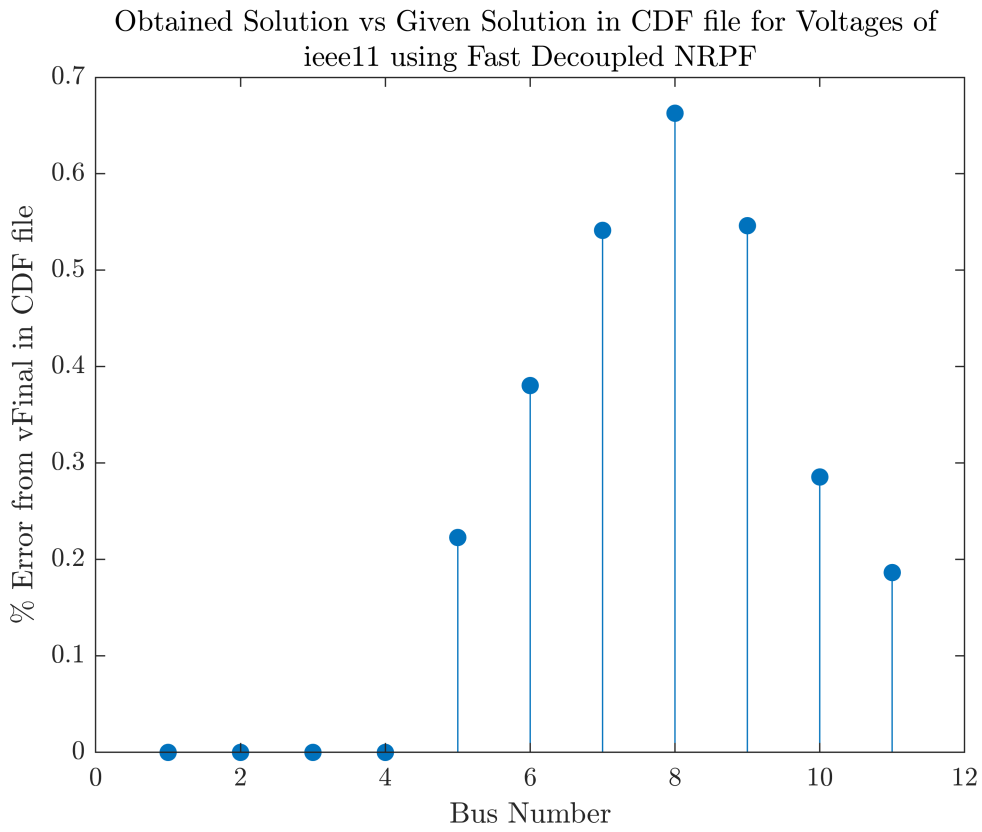
...

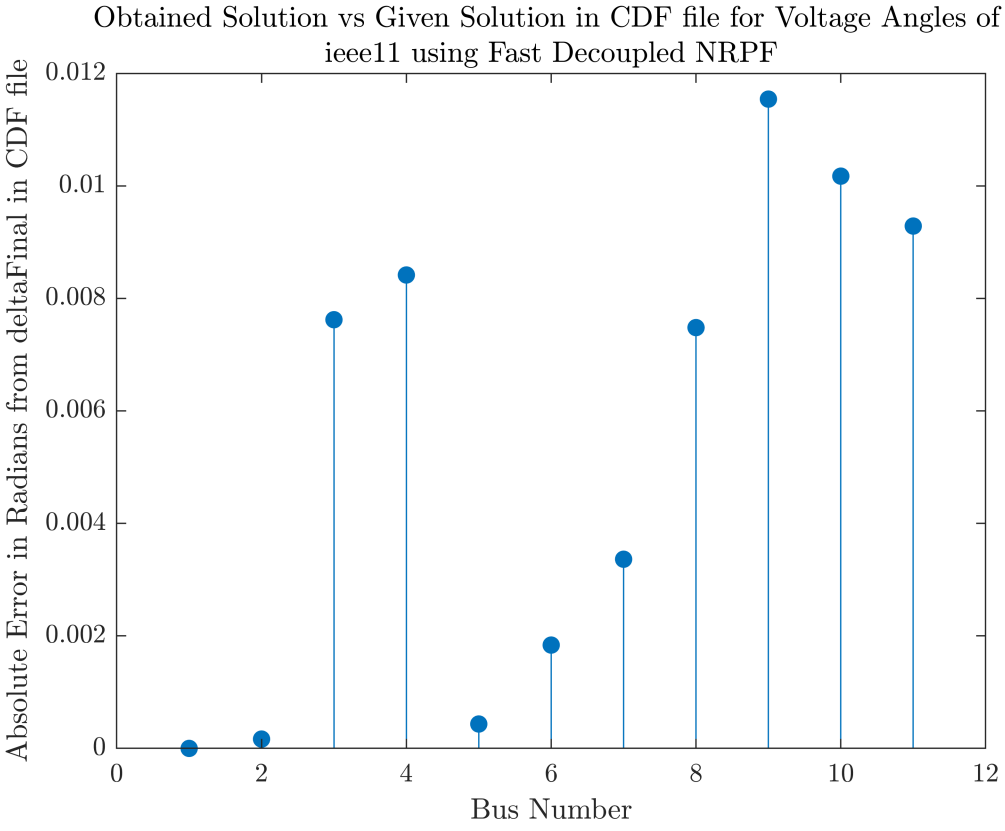
	$DeltaVByV_5$	$DeltaVByV_6$	$DeltaVByV_7$	$DeltaVByV_8$
1 Q_5	101.7561	6.9231	0	0
2 Q_6	-6.9231	193.1396	13.7985	0
3 Q_7	0	-13.7985	111.6690	4.0043
4 Q_8	0	0	-4.0043	33.6491
5 Q_9	0	0	0	-3.9637
6 Q_10	0	0	0	0
7 Q_11	0	0	0	0

```
Convergence using Fast Decoupled NRPF achieved in 15 iterations.
resultTable = 11×4 table
```

	P	Q	V	delta
1 Bus_1	6.9841	1.7193	1.0300	0
2 Bus_2	6.9999	2.0898	1.0100	-0.1691
3 Bus_3	7.1894	1.6439	1.0300	-0.4636
4 Bus_4	6.9993	1.7842	1.0100	-0.6408
5 Bus_5	-0.0001	0.0332	1.0082	-0.1123
6 Bus_6	-0.0001	0.1289	0.9817	-0.2870
7 Bus_7	-9.6684	-0.9079	0.9662	-0.4323
8 Bus_8	0.0002	0.0375	0.9553	-0.6704
9 Bus_9	-17.6618	-0.9235	0.9763	-0.9037
10 Bus_10	-0.0020	0.1126	0.9868	-0.7581
11 Bus_11	-0.0005	0.0279	1.0099	-0.5791

Compare obtained snapshot values of V_i and δ_i against the ones given in the CDF file.





Economic Dispatch and Optimal Power Flow Calculations:

```
Elapsed time is 3.608046 seconds.
```

Have a nice day!

In case you encounter a Java Heap Memory error, delete the above gif, or go to `Preferences->General->Java Heap Memory` and increase the allocated size.