POWER ENGINEERING LAB

REPORT FOR POWER FLOW SOLUTION METHODS

EXPERIMENTS:

2. Gauss Sidel Method & 3. Newton Raphson Method

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Matlab codes for both Gauss Sidel and Newton Raphson methods were written based on Hadi Saadat's Power System Analysis and from the flow charts given below.

Both the program methods gives:

1) Y Bus Matrix
2) Line Flow
3) Line Losses

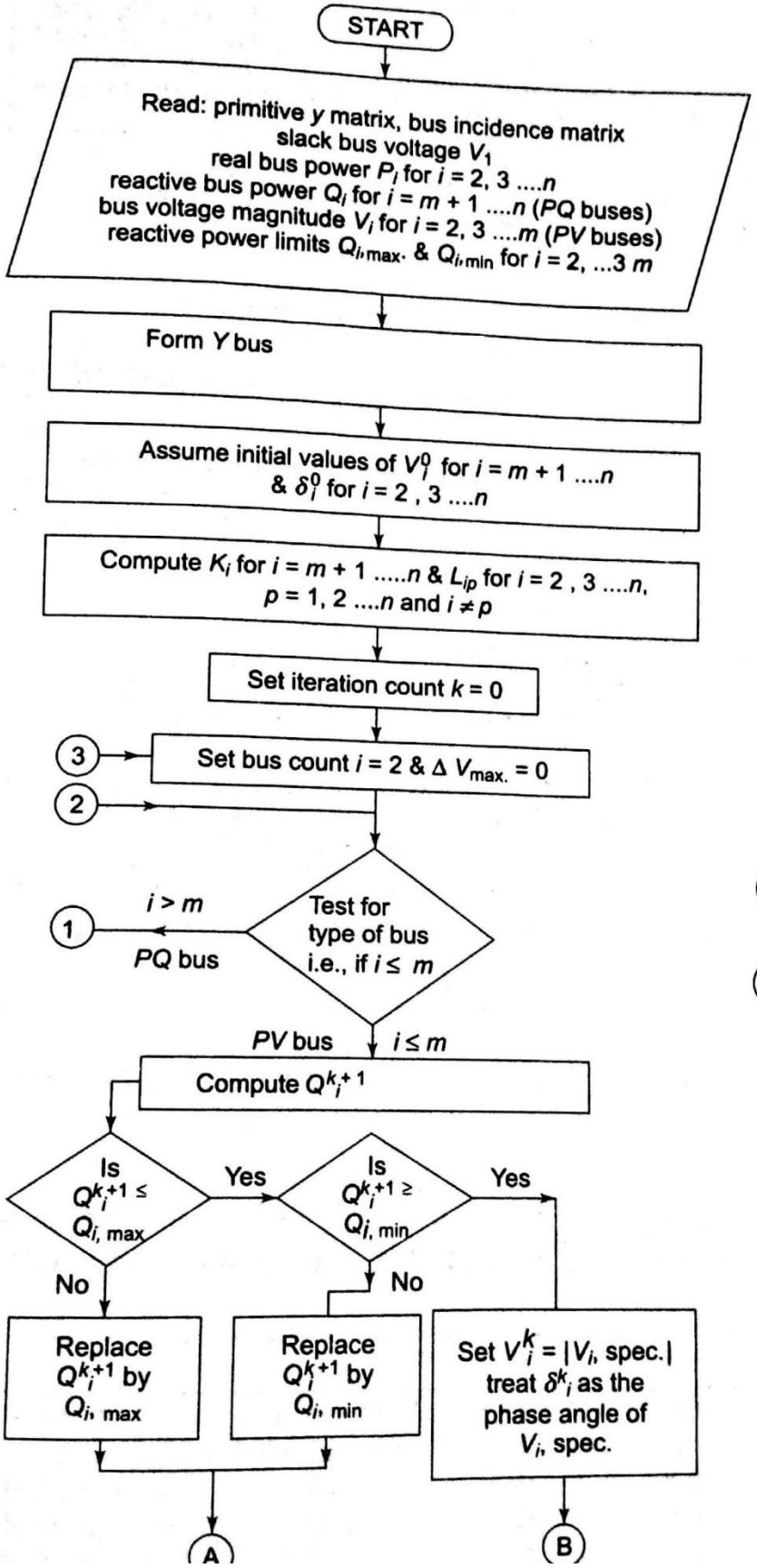
This code is devoid of:

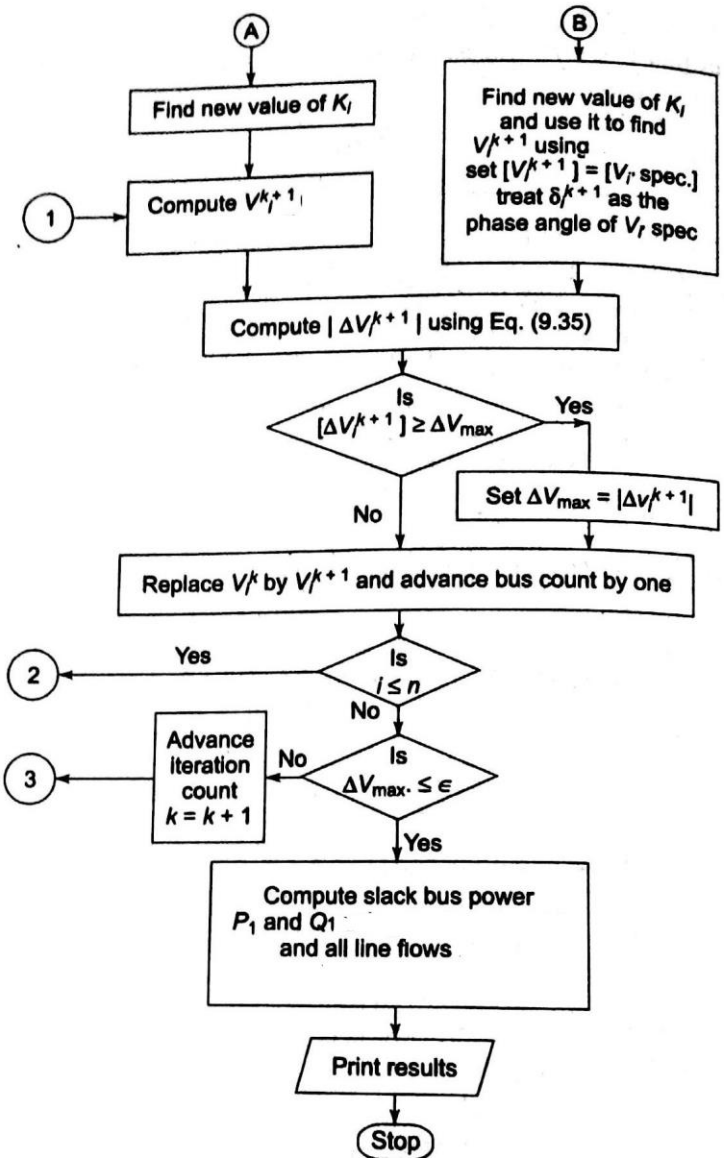
-Tap changing tansformer effects
-Charging of shunt capacitors
-Constraints

It is assured that all these negligence's will be taken care of and the code will be improved and rewritten soon.

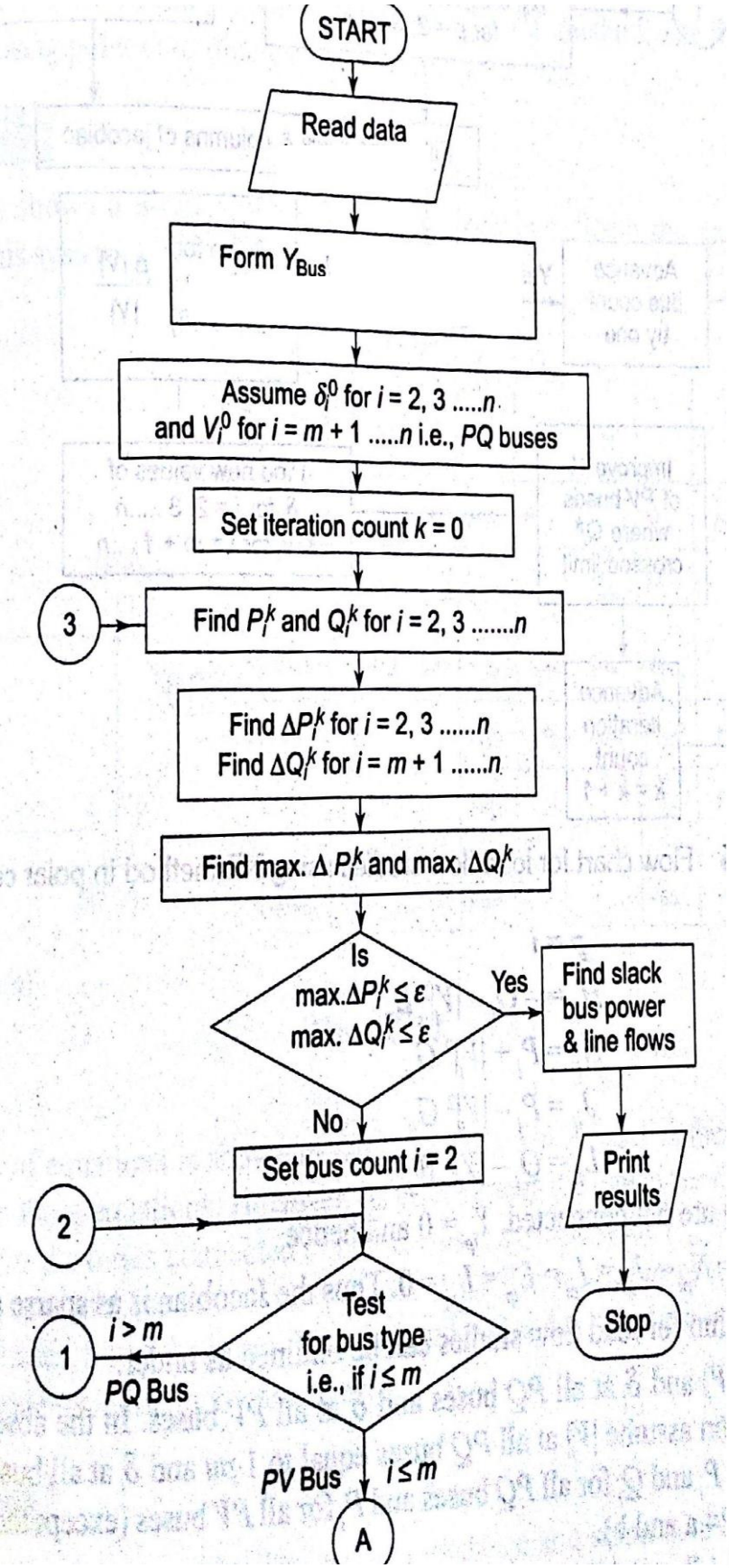
FLOW CHARTS:

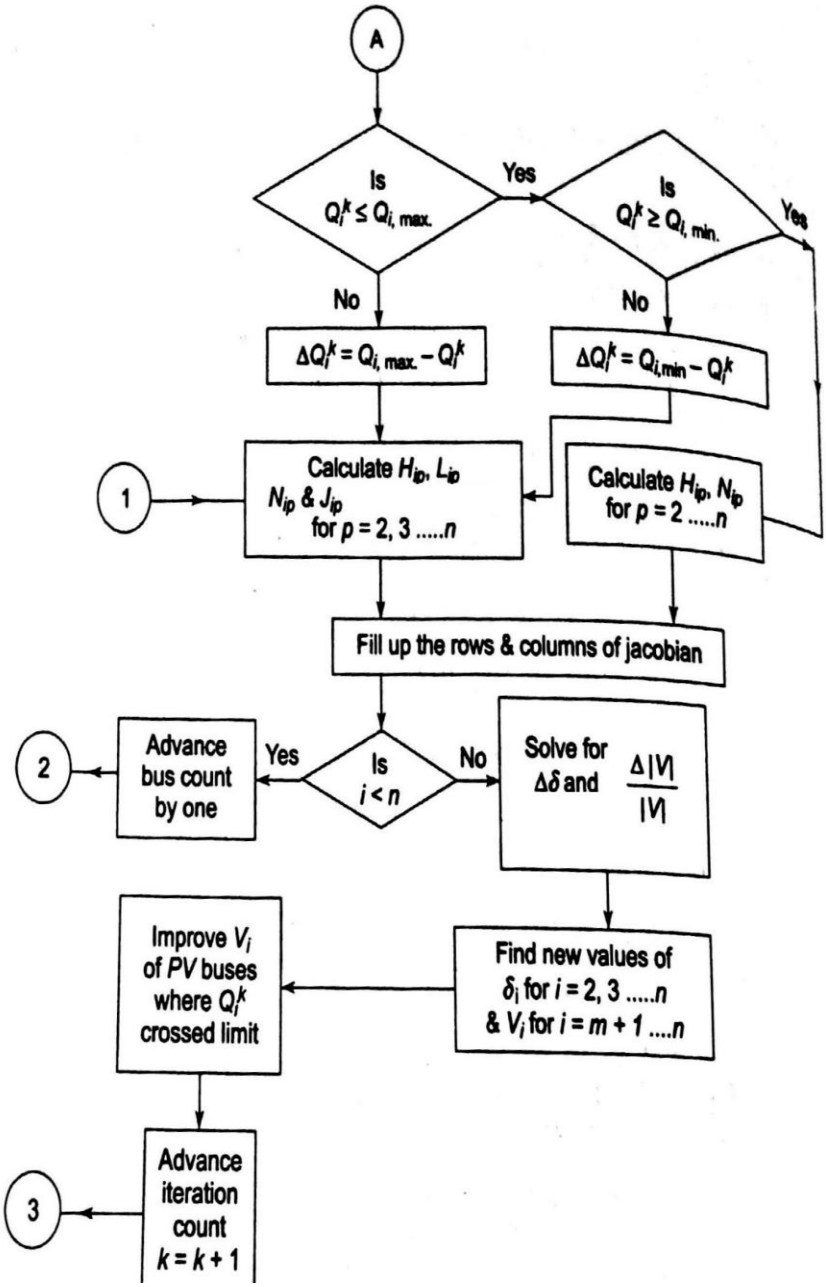
1.GAUSS SIDEL METHOD





2.NEWTON RAPHSON METHOD





OUTPUT SCREENSHOTS

```
Command Window
>> NRGS


        --------[POWER FLOW SOLUTIONS]---------

                      <--METHODS-->

   *1) GAUSS SIDEL METHOD        *2) NEWTON RAPHSON METHOD

  ENTER THE METHOD YOU PREFER :1


                GAUSS SIDEL SOLUTION

    1) Y BUS
    2) LINE FLOW SOLUTION
    3) LINE LOSSES SOLUTION
    4) EXIT

fx Choose your option :
```

```
Command Window
Choose your option : 2
                Power Flow Solution - Gauss-Seidel Method
                          30 Iterations

   Bus   Voltage   Angle     ------Load------     ---Generation---
   No.   Mag.      Degree      MW       Mvar        MW       Mvar

|    1 |  1.025 |   0.000 |   51.000 |   41.000 |  719.340 |  192.081
|    2 |  1.020 |  -0.934 |   22.000 |   15.000 |   79.000 | -112.255
|    3 |  1.025 |  -4.374 |   64.000 |   50.000 |   20.000 |  146.534
|    4 |  1.050 |  -4.008 |   25.000 |   10.000 |  100.000 |  292.528
|    5 |  1.045 |   1.171 |   50.000 |   30.000 |  300.000 |   92.526
|    6 |  1.010 |  -2.630 |   76.000 |   29.000 |    0.000 |    0.000
|    7 |  1.016 |  -3.455 |    0.000 |    0.000 |    0.000 |    0.000
|    8 |  1.021 |  -3.609 |    0.000 |    0.000 |    0.000 |    0.000
|    9 |  0.998 |  -5.677 |   89.000 |   50.000 |    0.000 |    0.000
|   10 |  1.002 |  -5.782 |    0.000 |    0.000 |    0.000 |    0.000
|   11 |  1.002 |  -3.258 |   25.000 |   15.000 |    0.000 |    0.000
|   12 |  1.017 |  -5.004 |   89.000 |   48.000 |    0.000 |    0.000
|   13 |  1.020 |  -4.576 |   31.000 |   15.000 |    0.000 |    0.000
|   14 |  1.012 |  -5.187 |   24.000 |   12.000 |    0.000 |    0.000
|   15 |  1.004 |  -5.697 |   70.000 |   31.000 |    0.000 |    0.000
|   16 |  0.993 |  -6.022 |   55.000 |   27.000 |    0.000 |    0.000
|   17 |  0.994 |  -4.949 |   78.000 |   38.000 |    0.000 |    0.000
|   18 |  1.011 |  -1.876 |  153.000 |   67.000 |    0.000 |    0.000
|   19 |  0.986 |  -6.434 |   75.000 |   15.000 |    0.000 |    0.000
|   20 |  0.992 |  -6.208 |   48.000 |   27.000 |    0.000 |    0.000
|   21 |  0.985 |  -5.852 |   46.000 |   23.000 |    0.000 |    0.000
|   22 |  0.987 |  -6.608 |   45.000 |   22.000 |    0.000 |    0.000
|   23 |  0.973 |  -7.193 |   25.000 |   12.000 |    0.000 |    0.000
|   24 |  0.969 |  -7.419 |   54.000 |   27.000 |    0.000 |    0.000
|   25 |  0.969 |  -6.855 |   28.000 |   13.000 |    0.000 |    0.000
|   26 |  1.015 |  -1.803 |   40.000 |   20.000 |   60.000 |   27.534

   Total                  1263.000      637.000    1278.340    638.948
```

```
Command Window
                Power Flow Solution - Newton-Raphson Method
                          4 Iterations

   Bus   Voltage   Angle     ------Load------     ---Generation---
   No.   Mag.      Degree      MW       Mvar        MW       Mvar

|    1 |  1.025 |   0.000 |   51.000 |   41.000 |  719.358 |  192.079
|    2 |  1.020 |  -0.934 |   22.000 |   15.000 |   79.000 | -112.254
|    3 |  1.025 |  -4.374 |   64.000 |   50.000 |   20.000 |  146.534
|    4 |  1.050 |  -4.008 |   25.000 |   10.000 |  100.000 |  292.529
|    5 |  1.045 |   1.171 |   50.000 |   30.000 |  300.000 |   92.527
|    6 |  1.010 |  -2.630 |   76.000 |   29.000 |    0.000 |    0.000
|    7 |  1.016 |  -3.456 |    0.000 |    0.000 |    0.000 |    0.000
|    8 |  1.021 |  -3.609 |    0.000 |    0.000 |    0.000 |    0.000
|    9 |  0.998 |  -5.677 |   89.000 |   50.000 |    0.000 |    0.000
|   10 |  1.002 |  -5.782 |    0.000 |    0.000 |    0.000 |    0.000
|   11 |  1.002 |  -3.258 |   25.000 |   15.000 |    0.000 |    0.000
|   12 |  1.017 |  -5.004 |   89.000 |   48.000 |    0.000 |    0.000
|   13 |  1.020 |  -4.576 |   31.000 |   15.000 |    0.000 |    0.000
|   14 |  1.012 |  -5.187 |   24.000 |   12.000 |    0.000 |    0.000
|   15 |  1.004 |  -5.697 |   70.000 |   31.000 |    0.000 |    0.000
|   16 |  0.993 |  -6.022 |   55.000 |   27.000 |    0.000 |    0.000
|   17 |  0.994 |  -4.949 |   78.000 |   38.000 |    0.000 |    0.000
|   18 |  1.011 |  -1.876 |  153.000 |   67.000 |    0.000 |    0.000
|   19 |  0.986 |  -6.434 |   75.000 |   15.000 |    0.000 |    0.000
|   20 |  0.992 |  -6.208 |   48.000 |   27.000 |    0.000 |    0.000
|   21 |  0.985 |  -5.852 |   46.000 |   23.000 |    0.000 |    0.000
|   22 |  0.987 |  -6.608 |   45.000 |   22.000 |    0.000 |    0.000
|   23 |  0.973 |  -7.193 |   25.000 |   12.000 |    0.000 |    0.000
|   24 |  0.969 |  -7.419 |   54.000 |   27.000 |    0.000 |    0.000
|   25 |  0.969 |  -6.855 |   28.000 |   13.000 |    0.000 |    0.000
|   26 |  1.015 |  -1.803 |   40.000 |   20.000 |   60.000 |   27.534

   Total                  1263.000      637.000    1278.358    638.950
```

COMPARING LINE FLOW SOLUTION OF BOTH GAUSS SIDEL AND NEWTON RAPHSON

We can see that the final solutions obtained are the same but the number of iterations taken by Gauss Sidel method (30 iterations) is more than that of Newton Raphson method (4 iterations).

The loss calculations using the both methods are shown below for every line:

Command Window

```
                    GAUSS SIDEL SOLUTION

    1) Y BUS
    2) LINE FLOW SOLUTION
    3) LINE LOSSES SOLUTION
    4) EXIT

Choose your option : 3

                          Line Flow and Losses

    --Line--    Power at bus & line flow    --Line loss--
    from  to     MW      Mvar     MVA         MW      Mvar

    1         668.340  151.081  685.203
          2   362.744   65.024  368.526    0.713    0.027
         18   305.601   86.287  317.550    1.261   -1.128

    2          57.000 -127.255  139.438
          1  -362.031  -64.996  367.819    0.713    0.027
          3   121.950  -14.840  122.850    0.127   -2.963
          7    76.829   -7.442   77.188    0.558   -0.350
          8   143.552  -38.170  148.540    1.485   -1.322
         13    68.286   -2.843   68.345    0.119   -0.811
         26     8.198    1.307    8.302    0.021    0.130

    3         -44.000   96.534  106.089
          2  -121.823   11.878  122.400    0.127   -2.963
         13    77.825   84.657  114.994    0.084    0.587

    4          75.000  282.528  292.314
          8   -26.936  125.882  128.732    0.120    3.587
         12   101.829  156.730  186.905    0.404    3.532
```

Command Window

5		250.000	62.526	257.701	
	6	250.212	62.994	258.020	4.500	-1.788
6		-76.000	-29.000	81.345	
	5	-245.712	-64.782	254.109	4.500	-1.788
	7	43.132	-29.685	52.360	0.139	0.607
	11	21.151	10.021	23.405	0.052	0.286
	18	-59.989	2.943	60.061	0.127	0.542
	19	101.658	29.519	105.857	0.188	-1.445
	21	63.437	23.060	67.498	0.125	-0.343
7		0.000	0.000	0.000	
	2	-76.271	7.091	76.600	0.558	-0.350
	6	-42.993	30.291	52.592	0.139	0.607
	8	26.639	-78.065	82.485	0.078	0.436
	9	92.475	40.729	101.047	-0.057	-0.687
8		0.000	0.000	0.000	
	2	-142.066	36.848	146.767	1.485	-1.322
	4	27.056	-122.295	125.252	0.120	3.587
	7	-26.561	78.501	82.872	0.078	0.436
	12	141.441	6.995	141.614	0.257	-0.637
9		-89.000	-50.000	102.083	
	7	-92.533	-41.415	101.378	-0.057	-0.687
	10	3.523	-8.584	9.279	-0.009	-0.158
10		0.000	0.000	0.000	
	9	-3.532	8.426	9.136	-0.009	-0.158
	12	-122.105	-92.626	153.262	0.472	1.027
	19	6.038	5.501	8.168	0.036	0.157
	20	62.428	39.235	73.734	0.348	0.669
	22	57.014	39.473	69.345	0.283	0.455
11		-25.000	-15.000	29.155	
	6	-21.100	-9.735	23.237	0.052	0.286
	25	24.079	3.437	24.323	0.519	-0.320
	26	-28.059	-8.697	29.376	0.118	0.014
12		-89.000	-48.000	101.119	
	4	-101.424	-153.198	183.729	0.404	3.532
	8	-141.184	-7.632	141.390	0.257	-0.637
	10	122.576	93.653	154.259	0.472	1.027
	14	5.965	4.574	7.517	0.018	0.044
	15	25.063	14.603	29.007	0.146	0.486
13		-31.000	-15.000	34.438	
	2	-68.167	2.032	68.197	0.119	-0.811
	3	-77.741	-84.070	114.505	0.084	0.587
	14	44.549	22.930	50.103	0.103	0.451
	15	36.539	19.286	41.317	0.190	1.001
	16	33.801	24.828	41.940	0.296	1.306
14		-24.000	-12.000	26.833	
	12	-5.947	-4.530	7.476	0.018	0.044
	13	-44.445	-22.478	49.806	0.103	0.451
	15	26.392	15.009	30.361	0.062	0.344
15		-70.000	-31.000	76.557	
	12	-24.917	-14.117	28.638	0.146	0.486
	13	-36.349	-18.285	40.689	0.190	1.001
	14	-26.330	-14.665	30.139	0.062	0.344
	16	17.596	16.066	23.827	0.118	0.288
16		-55.000	-27.000	61.270	
	13	-33.505	-23.522	40.938	0.296	1.306

Command Window

17	-78.000	-38.000	86.764		
16	9.413	-12.956	16.015	0.257	0.156
18	-91.267	-25.166	94.673	-0.043	-2.349
21	3.527	0.113	3.529	0.029	0.056
18	-153.000	-67.000	167.027		
1	-304.340	-87.416	316.646	1.261	-1.128
6	60.116	-2.401	60.164	0.127	0.542
17	91.223	22.817	94.034	-0.043	-2.349
19	-75.000	-15.000	76.485		
6	-101.471	-30.963	106.090	0.188	-1.445
10	-6.002	-5.345	8.036	0.036	0.157
23	11.356	7.215	13.454	0.056	0.244
24	15.536	9.876	18.410	0.084	0.058
25	5.514	4.212	6.939	0.020	-0.647
20	-48.000	-27.000	55.073		
10	-62.080	-38.566	73.084	0.348	0.669
16	-5.133	0.827	5.199	0.007	0.016
21	-1.854	4.816	5.161	0.018	0.043
22	21.067	5.923	21.884	0.073	0.178
21	-46.000	-23.000	51.430		
6	-63.312	-23.403	67.499	0.125	-0.343
17	-3.499	-0.057	3.499	0.029	0.056
20	1.872	-4.774	5.128	0.018	0.043
24	18.939	5.234	19.648	0.189	0.600
22	-45.000	-22.000	50.090		
10	-56.731	-39.018	68.854	0.283	0.455
20	-20.994	-5.744	21.766	0.073	0.178
23	12.744	9.700	16.015	0.076	0.261
24	19.980	13.063	23.872	0.182	0.515
23	-25.000	-12.000	27.731		
19	-11.300	-6.971	13.277	0.056	0.244
22	-12.667	-9.439	15.797	0.076	0.261
25	-1.033	4.410	4.529	0.021	0.025
24	-54.000	-27.000	60.374		
19	-15.452	-9.818	18.308	0.084	0.058
21	-18.749	-4.634	19.313	0.189	0.600
22	-19.799	-12.548	23.440	0.182	0.515
25	-28.000	-13.000	30.871		
11	-23.560	-3.756	23.857	0.519	-0.320
19	-5.495	-4.859	7.335	0.020	-0.647
23	1.055	-4.385	4.510	0.021	0.025
26	20.000	7.534	21.372		
2	-8.177	-1.177	8.261	0.021	0.130
11	28.176	8.710	29.492	0.118	0.014
Total loss				13.969	3.181

And by Newton Raphson method we get:

Command Window

--Line-- from	to	Power at bus & line flow MW	Mvar	MVA	--Line loss-- MW	Mvar
1		668.358	151.079	685.221		
	2	362.754	65.023	368.535	0.713	0.028
	18	305.604	86.287	317.552	1.261	-1.128
2		57.000	-127.254	139.436		
	1	-362.040	-64.995	367.828	0.713	0.028
	3	121.952	-14.840	122.852	0.127	-2.962
	7	76.830	-7.442	77.190	0.558	-0.350
	8	143.554	-38.170	148.542	1.485	-1.322
	13	68.287	-2.843	68.346	0.119	-0.811
	26	8.198	1.307	8.302	0.021	0.130
3		-44.000	96.534	106.089		
	2	-121.825	11.878	122.402	0.127	-2.962
	13	77.821	84.658	114.992	0.084	0.587
4		75.000	282.529	292.314		
	8	-26.938	125.882	128.732	0.120	3.587
	12	101.827	156.730	186.904	0.404	3.532
5		250.000	62.527	257.701		
	6	250.211	62.995	258.019	4.500	-1.788
6		-76.000	-29.000	81.345		
	5	-245.711	-64.783	254.108	4.500	-1.788
	7	43.133	-29.684	52.360	0.139	0.607
	11	21.151	10.021	23.405	0.052	0.286
	18	-59.992	2.943	60.065	0.127	0.542
	19	101.658	29.519	105.857	0.188	-1.445
	21	63.437	23.060	67.498	0.125	-0.343

7		0.000	0.000	0.000		
	2	-76.272	7.091	76.601	0.558	-0.350
	6	-42.994	30.291	52.593	0.139	0.607
	8	26.637	-78.065	82.484	0.078	0.436
	9	92.476	40.729	101.048	-0.057	-0.687
8		0.000	0.000	0.000		
	2	-142.069	36.848	146.769	1.485	-1.322
	4	27.057	-122.295	125.252	0.120	3.587
	7	-26.558	78.500	82.871	0.078	0.436
	12	141.441	6.994	141.614	0.257	-0.637
9		-89.000	-50.000	102.083		
	7	-92.533	-41.415	101.378	-0.057	-0.687
	10	3.523	-8.584	9.279	-0.009	-0.158
10		0.000	0.000	0.000		
	9	-3.532	8.426	9.137	-0.009	-0.158
	12	-122.107	-92.625	153.263	0.472	1.027
	19	6.038	5.502	8.168	0.036	0.157
	20	62.427	39.236	73.733	0.348	0.669
	22	57.013	39.473	69.344	0.283	0.455
11		-25.000	-15.000	29.155		
	6	-21.099	-9.735	23.237	0.052	0.286
	25	24.079	3.437	24.323	0.519	-0.320
	26	-28.059	-8.697	29.376	0.118	0.014
12		-89.000	-48.000	101.119		
	4	-101.423	-153.198	183.728	0.404	3.532
	8	-141.184	-7.632	141.390	0.257	-0.637
	10	122.579	93.653	154.261	0.472	1.027
	14	5.965	4.574	7.517	0.018	0.044
	15	25.063	14.603	29.007	0.146	0.486

Command Window

13		-31.000	-15.000	34.438		
	2	-68.168	2.032	68.198	0.119	-0.811
	3	-77.737	-84.071	114.503	0.084	0.587
	14	44.548	22.930	50.103	0.103	0.451
	15	36.539	19.286	41.317	0.190	1.001
	16	33.801	24.828	41.940	0.296	1.306
14		-24.000	-12.000	26.833		
	12	-5.947	-4.530	7.476	0.018	0.044
	13	-44.445	-22.479	49.806	0.103	0.451
	15	26.392	15.009	30.361	0.062	0.344
15		-70.000	-31.000	76.557		
	12	-24.917	-14.117	28.638	0.146	0.486
	13	-36.349	-18.285	40.689	0.190	1.001
	14	-26.330	-14.665	30.139	0.062	0.344
	16	17.596	16.066	23.827	0.118	0.288
16		-55.000	-27.000	61.270		
	13	-33.505	-23.522	40.937	0.296	1.306
	15	-17.478	-15.778	23.546	0.118	0.288
	17	-9.157	13.112	15.993	0.257	0.156
	20	5.139	-0.811	5.203	0.007	0.016
17		-78.000	-38.000	86.764		
	16	9.414	-12.956	16.015	0.257	0.156
	18	-91.267	-25.166	94.673	-0.043	-2.349
	21	3.527	0.113	3.529	0.029	0.056
18		-153.000	-67.000	167.027		
	1	-304.343	-87.415	316.648	1.261	-1.128
	6	60.119	-2.401	60.167	0.127	0.542
	17	91.224	22.817	94.034	-0.043	-2.349

Command Window

```
          17   91.224   22.817   94.034   -0.043   -2.349

    19        -75.000  -15.000   76.485
           6 -101.471  -30.963  106.090    0.188   -1.445
          10   -6.001   -5.345    8.036    0.036    0.157
          23   11.355    7.215   13.454    0.056    0.244
          24   15.536    9.876   18.410    0.084    0.058
          25    5.514    4.212    6.939    0.020   -0.647

    20        -48.000  -27.000   55.073
          10  -62.079  -38.567   73.084    0.348    0.669
          16   -5.133    0.827    5.199    0.007    0.016
          21   -1.855    4.817    5.161    0.018    0.043
          22   21.067    5.923   21.883    0.073    0.178

    21        -46.000  -23.000   51.430
           6  -63.312  -23.403   67.499    0.125   -0.343
          17   -3.499   -0.057    3.499    0.029    0.056
          20    1.872   -4.774    5.128    0.018    0.043
          24   18.939    5.234   19.648    0.189    0.600

    22        -45.000  -22.000   50.090
          10  -56.730  -39.019   68.853    0.283    0.455
          20  -20.994   -5.745   21.765    0.073    0.178
          23   12.743    9.700   16.015    0.076    0.261
          24   19.980   13.063   23.871    0.182    0.515

    23        -25.000  -12.000   27.731
          19  -11.300   -6.971   13.277    0.056    0.244
          22  -12.667   -9.439   15.797    0.076    0.261
          25   -1.033    4.410    4.530    0.021    0.025

    24        -54.000  -27.000   60.374
          19  -15.452   -9.818   18.308    0.084    0.058
          21  -18.749   -4.634   19.313    0.189    0.600
fx        22  -19.799  -12.548   23.440    0.182    0.515

25        -28.000  -13.000   30.871
      11  -23.560   -3.756   23.857    0.519   -0.320
      19   -5.495   -4.859    7.335    0.020   -0.647
      23    1.055   -4.385    4.510    0.021    0.025

26         20.000    7.534   21.372
       2   -8.177   -1.177    8.261    0.021    0.130
      11   28.177    8.710   29.492    0.118    0.014

Total loss                              13.969    3.182
```

And so we get the same losses from both the methods.

SCREEN-SHOTS:

```
            --------[POWER FLOW SOLUTIONS]---------

                        <--METHODS-->

     *1) GAUSS SIDEL METHOD        *2) NEWTON RAPHSON METHOD     *3) FAST DECOUPLED METHOD

              [Tolerance: 0.0001]     [Acceleration Factor:1.6]

   ENTER THE METHOD YOU PREFER :3


                     FAST DECOUPLED SOLUTION

      1) Y BUS
      2) LINE FLOW SOLUTION
      3) LINE LOSSES SOLUTION
      4) EXIT

fx  Choose your option :
```

Command Window

```
Choose your option : 2
                    Power Flow Solution - Fast Decoupled Method
                                  20 Iterations

   Bus    Voltage    Angle      ------Load------      ---Generation---
   No.    Mag.       Degree       MW        Mvar        MW        Mvar

|    1 |  1.025 |    0.000 |    51.000 |    41.000 |  719.358 |  192.077
|    2 |  1.020 |   -0.934 |    22.000 |    15.000 |   79.000 | -112.254
|    3 |  1.025 |   -4.374 |    64.000 |    50.000 |   20.000 |  146.536
|    4 |  1.050 |   -4.008 |    25.000 |    10.000 |  100.000 |  292.530
|    5 |  1.045 |    1.171 |    50.000 |    30.000 |  300.000 |   92.527
|    6 |  1.010 |   -2.630 |    76.000 |    29.000 |    0.000 |    0.000
|    7 |  1.016 |   -3.456 |     0.000 |     0.000 |    0.000 |    0.000
|    8 |  1.021 |   -3.609 |     0.000 |     0.000 |    0.000 |    0.000
|    9 |  0.998 |   -5.677 |    89.000 |    50.000 |    0.000 |    0.000
|   10 |  1.002 |   -5.782 |     0.000 |     0.000 |    0.000 |    0.000
|   11 |  1.002 |   -3.258 |    25.000 |    15.000 |    0.000 |    0.000
|   12 |  1.017 |   -5.004 |    89.000 |    48.000 |    0.000 |    0.000
|   13 |  1.020 |   -4.576 |    31.000 |    15.000 |    0.000 |    0.000
|   14 |  1.012 |   -5.187 |    24.000 |    12.000 |    0.000 |    0.000
|   15 |  1.004 |   -5.697 |    70.000 |    31.000 |    0.000 |    0.000
|   16 |  0.993 |   -6.022 |    55.000 |    27.000 |    0.000 |    0.000
|   17 |  0.994 |   -4.949 |    78.000 |    38.000 |    0.000 |    0.000
|   18 |  1.011 |   -1.876 |   153.000 |    67.000 |    0.000 |    0.000
|   19 |  0.986 |   -6.434 |    75.000 |    15.000 |    0.000 |    0.000
|   20 |  0.992 |   -6.208 |    48.000 |    27.000 |    0.000 |    0.000
|   21 |  0.985 |   -5.852 |    46.000 |    23.000 |    0.000 |    0.000
|   22 |  0.987 |   -6.608 |    45.000 |    22.000 |    0.000 |    0.000
|   23 |  0.973 |   -7.193 |    25.000 |    12.000 |    0.000 |    0.000
|   24 |  0.969 |   -7.419 |    54.000 |    27.000 |    0.000 |    0.000
|   25 |  0.969 |   -6.855 |    28.000 |    13.000 |    0.000 |    0.000
|   26 |  1.015 |   -1.803 |    40.000 |    20.000 |   60.000 |   27.534

   Total                    1263.000      637.000    1278.358    638.950
```

Line Flow and Losses

--Line-- from	to	Power at bus & line flow MW	Mvar	MVA	--Line loss-- MW	Mvar
1		668.358	151.077	685.220		
	2	362.753	65.023	368.534	0.713	0.028
	18	305.606	86.288	317.554	1.261	-1.128
2		57.000	-127.254	139.436		
	1	-362.039	-64.995	367.827	0.713	0.028
	3	121.952	-14.840	122.851	0.127	-2.962
	7	76.830	-7.442	77.190	0.558	-0.350
	8	143.554	-38.170	148.542	1.485	-1.322
	13	68.286	-2.843	68.345	0.119	-0.811
	26	8.198	1.307	8.302	0.021	0.130
3		-44.000	96.536	106.091		
	2	-121.824	11.878	122.402	0.127	-2.962
	13	77.820	84.658	114.991	0.084	0.587
4		75.000	282.530	292.315		
	8	-26.938	125.882	128.732	0.120	3.587
	12	101.827	156.730	186.904	0.404	3.532
5		250.000	62.527	257.701		
	6	250.211	62.995	258.020	4.500	-1.788
6		-76.000	-29.000	81.345		
	5	-245.711	-64.783	254.108	4.500	-1.788
	7	43.132	-29.685	52.360	0.139	0.607
	11	21.151	10.021	23.405	0.052	0.286
	18	-59.992	2.943	60.064	0.127	0.542
	19	101.658	29.519	105.857	0.188	-1.445
	21	63.437	23.060	67.498	0.125	-0.343

Command Window

7		0.000	0.000	0.000		
	2	-76.272	7.091	76.601	0.558	-0.350
	6	-42.994	30.291	52.593	0.139	0.607
	8	26.636	-78.065	82.484	0.078	0.436
	9	92.476	40.729	101.047	-0.057	-0.687
8		0.000	0.000	0.000		
	2	-142.068	36.848	146.769	1.485	-1.322
	4	27.057	-122.295	125.252	0.120	3.587
	7	-26.558	78.500	82.871	0.078	0.436
	12	141.441	6.994	141.613	0.257	-0.637
9		-89.000	-50.000	102.083		
	7	-92.533	-41.415	101.378	-0.057	-0.687
	10	3.523	-8.584	9.279	-0.009	-0.158
10		0.000	0.000	0.000		
	9	-3.532	8.426	9.137	-0.009	-0.158
	12	-122.107	-92.625	153.263	0.472	1.027
	19	6.038	5.502	8.168	0.036	0.157
	20	62.426	39.236	73.733	0.348	0.669
	22	57.013	39.473	69.344	0.283	0.455
11		-25.000	-15.000	29.155		
	6	-21.099	-9.735	23.237	0.052	0.286
	25	24.079	3.437	24.323	0.519	-0.320
	26	-28.059	-8.697	29.376	0.118	0.014
12		-89.000	-48.000	101.119		
	4	-101.423	-153.198	183.728	0.404	3.532
	8	-141.183	-7.632	141.390	0.257	-0.637
	10	122.578	93.653	154.260	0.472	1.027
	14	5.965	4.574	7.517	0.018	0.044
	15	25.063	14.603	29.006	0.146	0.486

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13		-31.000	-15.000	34.438		
	2	-68.168	2.032	68.198	0.119	-0.811
	3	-77.736	-84.071	114.502	0.084	0.587
	14	44.548	22.930	50.103	0.103	0.451
	15	36.539	19.286	41.316	0.190	1.001
	16	33.800	24.828	41.939	0.296	1.306
14		-24.000	-12.000	26.833		
	12	-5.947	-4.530	7.476	0.018	0.044
	13	-44.445	-22.479	49.806	0.103	0.451
	15	26.392	15.009	30.361	0.062	0.344
15		-70.000	-31.000	76.557		
	12	-24.916	-14.117	28.637	0.146	0.486
	13	-36.349	-18.285	40.689	0.190	1.001
	14	-26.330	-14.665	30.138	0.062	0.344
	16	17.594	16.066	23.826	0.118	0.288
16		-55.000	-27.000	61.270		
	13	-33.504	-23.522	40.937	0.296	1.306
	15	-17.477	-15.778	23.545	0.118	0.288
	17	-9.155	13.111	15.991	0.257	0.156
	20	5.141	-0.811	5.204	0.007	0.016
17		-78.000	-38.000	86.764		
	16	9.412	-12.955	16.013	0.257	0.156
	18	-91.268	-25.166	94.674	-0.043	-2.349
	21	3.527	0.113	3.529	0.029	0.056
18		-153.000	-67.000	167.027		
	1	-304.344	-87.416	316.650	1.261	-1.128
	6	60.119	-2.401	60.166	0.127	0.542
	17	91.225	22.817	94.035	-0.043	-2.349

19		-75.000	-15.000	76.485		
	6	-101.471	-30.963	106.090	0.188	-1.445
	10	-6.001	-5.345	8.036	0.036	0.157
	23	11.356	7.215	13.454	0.056	0.244
	24	15.536	9.876	18.410	0.084	0.058
	25	5.514	4.212	6.939	0.020	-0.647
20		-48.000	-27.000	55.073		
	10	-62.078	-38.567	73.083	0.348	0.669
	16	-5.134	0.827	5.200	0.007	0.016
	21	-1.854	4.816	5.161	0.018	0.043
	22	21.067	5.923	21.884	0.073	0.178
21		-46.000	-23.000	51.430		
	6	-63.312	-23.403	67.499	0.125	-0.343
	17	-3.498	-0.057	3.499	0.029	0.056
	20	1.872	-4.774	5.128	0.018	0.043
	24	18.938	5.234	19.648	0.189	0.600
22		-45.000	-22.000	50.090		
	10	-56.730	-39.019	68.853	0.283	0.455
	20	-20.994	-5.745	21.766	0.073	0.178
	23	12.744	9.700	16.015	0.076	0.261
	24	19.980	13.063	23.872	0.182	0.515
23		-25.000	-12.000	27.731		
	19	-11.300	-6.971	13.277	0.056	0.244
	22	-12.667	-9.439	15.797	0.076	0.261
	25	-1.034	4.410	4.530	0.021	0.025
24		-54.000	-27.000	60.374		
	19	-15.452	-9.818	18.308	0.084	0.058
	21	-18.749	-4.634	19.313	0.189	0.600
	22	-19.799	-12.548	23.440	0.182	0.515
25		-28.000	-13.000	30.871		
	11	-23.560	-3.756	23.857	0.519	-0.320
	19	-5.495	-4.859	7.335	0.020	-0.647
	23	1.055	-4.385	4.510	0.021	0.025
26		20.000	7.534	21.372		
	2	-8.177	-1.177	8.261	0.021	0.130
	11	28.177	8.710	29.492	0.118	0.014
Total loss					13.969	3.182

fx >>