

# Computer Application of Power system

## Explanation of Assignment2

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As we know, there are four power system states in our question. And I pick up some samples from 4 clusters of my results.

- High load rate during peak hours
- Shut down of generator for maintenance
- Low load rate during night
- Disconnection of a line for maintenance

Cluster1:	1.0 0.0 1.0 -21.23476186 1.0 -25.65074806 0.893559622 -15.45141525 0.853067982 - 28.14032261 0.955335052 -28.639435 0.905764558 -33.42412682 0.937520052 - 27.47308835 0.802191497 -30.23785444
	1.0 0.0 1.0 -22.48106508 1.0 -27.17286786 0.882785288 -15.70887584 0.826730774 - 29.15501314 0.945220136 -30.19356661 0.888655337 -35.21891587 0.928842125 - 28.7779093 0.792425898 -30.62690617
Cluster2:	1.0 0.0 1.0 24.46897112 1.0 19.168357 0.990859274 4.136099017 0.996392863 7.225831862 1.015086857 16.35574123 1.012380629 16.87323232 1.010194155 18.68102738 0.98099641 7.640070533
	1.0 0.0 1.0 24.40406311 1.0 19.04240251 0.98810241 4.15588286 0.988487524 7.204645759 1.011986978 16.22116428 1.006752931 16.67276441 1.007731569 18.60192694 0.979042357 7.802716784
Cluster3:	1.0 0.0 1.0 18.45728433 1.0 19.59482758 0.971920253 -2.788958476 0.943776555 - 8.07210972 1.005698048 16.7559329 0.98194677 11.90658861 0.989277519 12.54653269 0.934257828 -1.823411359
	1.0 0.0 1.0 18.03651407 1.0 18.98294143 0.972695536 -2.772771705 0.944365584 - 8.101078483 1.005742792 16.14417315 0.982075919 11.29484385 0.989903539 12.12951373 0.936399899 -1.746589385
Cluster4:	1.0 0.0 1.0 1.686341506 1.0 -9.423683333 0.989445483 -5.375994179 0.976773257 - 10.04228279 0.999480983 -9.423683333 0.982596905 -8.781879227 0.995411402 - 4.187858585 0.961810715 -9.074832794
	1.0 0.0 1.0 1.488378591 1.0 -9.685491089 0.989755938 -5.374204844 0.97673049 - 10.16487111 0.999285495 -9.685491089 0.98210399 -9.121850535 0.995318214 - 4.386373413 0.962805261 -8.952918245

### 1. High load rate during peak hours

During peak hours, generator produce active and reactive power to load. So active and reactive power of each bus is positive and relatively large. The voltage angle should lead the current angle. When I checked the results, I found cluster2 fulfilled this requirement.

### 2. Shut down of generator for maintenance

When we shut down generators for maintenance, they will no longer produce power to power system. Instead, power feeds from load to bus. So its voltage angle may be negative. I think cluster1 presents this condition.

### 3. Low load rate during night

During night, the load is low and system doesn't need to produce as much reactive power as it did in daytime. So the angles of some generator will be negative and smaller. Cluster4 is related to this condition.

### 4. Disconnection of a line for maintenance

If we disconnect a line, of course we will change the power flow of system, especially in two buses connected with that line. But generators are still producing power to system. Compare all clusters with high load rate during peak hours(cluster2), I found cluster3 is most likely.