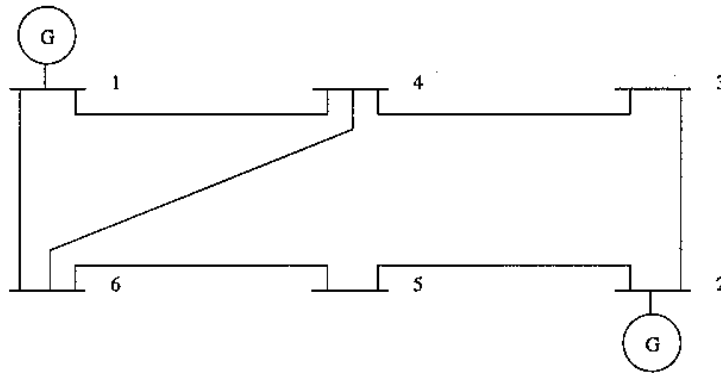


EE531 Homework 1 Due Monday 9/8 Hardcopy or Electronic

System in Figure 3.13 Page 79 of text (attached on the next page for convenience); You may work in groups. Please use mathcad, matlab or similar tool and save your stuff. We will use this model several more times.

System base is 115 kV, 100 MVA. Assume each generator has a subtransient impedance of $j 0.1$ pu on system base. Load is ignored. You have already calculated fault current and all branch currents for a three-phase fault at bus 5.

- 1. What is the available fault current(A) and the SCC(MVA) at bus 5?*
- 2. Assume all voltages are 1 pu. If I connect a 20 MVAR capacitor at bus 6 calculate the new voltages at buses 6 and 5.. Does your solution involve any approximations?*
- 3. Define buses 2,3,4,5 to be the 'external system', buses 4 and 5 the boundary, and buses 1 and 6 to be your system. Develop the external equivalent and then use it to calculate fault current at bus 5. Compare with your previous answer*

**FIGURE 3.13**4. **Ward-Hale 6 bus system**

The data for the system shown in Figure 3.13 are given below:

No.	Type	$ V $	θ	P_{gen}	Q_{gen}	P_{load}	Q_{load}
1	0	1.05	0	0	0	0.25	0.1
2	1	1.05	0	0.5	0	0.15	0.05
3	2	1.00	0	0	0	0.275	0.11
4	2	1.00	0	0	0	0	0
5	2	1.00	0	0	0	0.15	0.09
6	2	1.00	0	0	0	0.25	0.15

No.	To	From	R	X	B
1	1	4	0.020	0.185	0.009
2	1	6	0.031	0.259	0.010
3	2	3	0.006	0.025	0.000
4	2	5	0.071	0.320	0.015
5	4	6	0.024	0.204	0.010
6	3	4	0.075	0.067	0.000
7	5	6	0.025	0.150	0.017

Calculate the load flow solution for the system data given above.