EE531 Homework 1 Due Wednesday 8/29/07

System in Figure 3.13 Page 79 of text

1, Assume each generator has a subtransient impedance of j 0.1 pu on system base.

Develop incidence matrix C and primitive admittance matrix yprim
Calculate the admittance matrix Y using C^T yprim C; check using rules
For a three phase fault at bus 5, find fault current, all voltages, and all branch currents

Now assume lines 2-5 and 5-6 are mutually coupled[1]. The primitive impedance matrix for this line pair is

$$z = \begin{bmatrix} 0.071 + j0.32 & j.03 \\ j.03 & 0.025 + j0.15 \end{bmatrix} \; pu$$

Calculate the admittance matrix Y and primitive admittance matrix yprim
Calculate the admittance matrix Y using C^T yprim C; check using rules
For a three phase fault at bus 5, find fault current, all voltages, and all branch currents

You may work in groups. Please use mathcad, matlab or similar tool and save your stuff. We will use this model several more times.

---

[1] *This is a positive sequence network and normally we would not see significant coupling; so this problem is more for practice.*

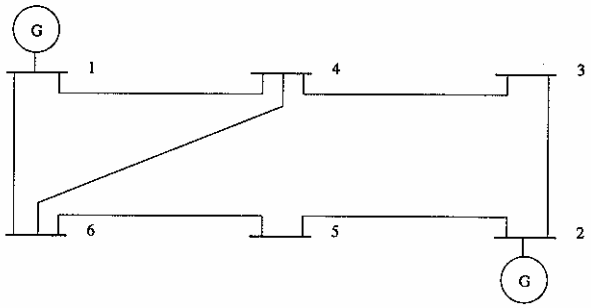

FIGURE 3.13
Ward-Hale 6 bus system

6. 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