

Class Project Part 2

Due: Tuesday May 29, 2007, at: 12:00 noon

The 7 bus power system is shown in Figure 1. The system has 2 generators, 2 transformers, 6 transmission lines, and 3 loads.

Perform fault studies on the system assume base case generator setpoints from Table 1, which are listed below). **Use Base System $V_B = 13.8$ kV and $S_B = 100$ MVA**

Table 1

V_1	$1.02 \angle 0.0^\circ$
V_2	$1.04 \angle 4.2^\circ$
V_3	$0.923 \angle -7.9^\circ$
V_4	$0.901 \angle -12.4^\circ$
V_5	$0.958 \angle -5.8^\circ$
V_6	$0.990 \angle -3.7^\circ$
V_7	$0.999 \angle -1.3^\circ$
P_{G1}	65.42 MW
Q_{G1}	32.47 MVA _r
P_{G2}	100 MW
Q_{G2}	46.93 MVA _r
P_{Losses}	5.42 MW

- A Choose generator grounding resistances so that the single line to ground fault current contribution from the generator to a fault at Bus 1 (from Gen-1) and Bus 2 (from Gen-2) are limited to 100A in each case. Calculate by hand and then verify with the simulation tool.
- B Find the fault currents supplied by the generator transformers for faults applied at each bus in the system except buses 1 and 2. Apply SLG, L-L, DLG and 3-Phase faults. List the total currents out of Bus 6 and 7 as well as the currents seen by the breakers on the lines leaving those buses. Present your results in a table and comment on which are the largest currents.
- C Also tabulate the voltages at each bus for the cases in part B and comment on under and over voltages if any.

$$\text{Line 4-6: } z_1 = z_2 = 79.35 + j 317.4 \Omega \text{ \& } z_0 = 10 \text{ } z_1 \text{ } y_1 = j0.0001134 \text{ S} \quad y_0 = 0.5y_1$$

$$\text{Line 3-4: } z_1 = z_2 = 52.9 + j 211.6 \Omega \text{ \& } z_0 = 10 \text{ } z_1 \text{ } y_1 = j0.00007562 \text{ S} \quad y_0 = 0.5y_1$$

$$\text{Line 3-6: } z_1 = z_2 = 52.9 + j 211.6 \Omega \text{ \& } z_0 = 10 \text{ } z_1 \text{ } y_1 = j0.00007562 \text{ S} \quad y_0 = 0.5y_1$$

$$\text{Line 5-6: } z_1 = z_2 = 26.45 + j 105.8 \Omega \text{ \& } z_0 = 10 \text{ } z_1 \text{ } y_1 = j0.00003781 \text{ S} \quad y_0 = 0.5y_1$$

$$\text{Line 3-7: } z_1 = z_2 = 26.45 + j 105.8 \Omega \text{ \& } z_0 = 10 \text{ } z_1 \text{ } y_1 = j0.00003781 \text{ S} \quad y_0 = 0.5y_1$$

$$\text{Line 5-7: } z_1 = z_2 = 26.45 + j 105.8 \Omega \text{ \& } z_0 = 10 \text{ } z_1 \text{ } y_1 = j0.00003781 \text{ S} \quad y_0 = 0.5y_1$$

Load at bus 3: $P_3 = 60$ MW & $Q_3 = 30$ MVA_r, ungrounded Y.

Load at bus 4: $P_4 = 40$ MW & $Q_4 = 10$ MVA_r, ungrounded Y.

Load at bus 5: $P_5 = 60$ MW & $Q_5 = 20$ MVA_r, ungrounded Y.

Transformer 1 data = transformer 2 data.

