EE 457 Homework #2: Due Tuesday, January 27

1. Consider the two-bus system shown in Fig. 11. The two generators and transformers are assumed of equal rating – 300 MVA – which is the 3-phase base power for all pu unit data given in what follows.

- Line has series reactance of 0.20 pu
- Pre-fault bus voltage magnitudes are both 1.0 pu.
- The generators are sharing the total real power load equally.
- Assume that the prefault bus voltage at bus 1 is the reference (i.e., has 0 degree phase angle).
- The transformers both have leakage reactance of 0.12 pu.
- Both generators have subtransient reactance of 0.1 pu.
  a. For the pre-fault conditions, compute the pu real power consumed by each load, the pu real power delivered by each generator, the power angle δ, and the pu reactive power delivered by each generator.
  b. Compute the prefault currents into each load.
  c. Compute the fault current for a symmetric three-phase fault occurs on bus 1, with fault impedance $Z_f=0$.
  d. Compare the fault current computed in (c) with the pre-fault load currents computed in (b).

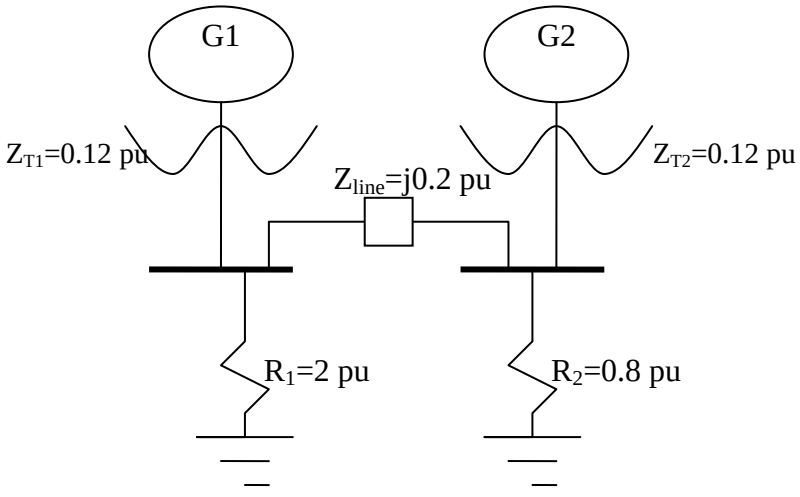

Fig. 11

2. The one-line diagram of a three-bus power system is shown in Fig. 12. Each generator is represented by an emf behind the transient reactance. All impedances are expressed in pu on a common 100 MVA base. Determine the fault current, the bus voltages, and the line currents *during the fault* when a balanced three-phase fault with fault impedance Z_f=j0.16 pu occurs on bus 1. Assume that all pre-fault bus voltages are 1.0 pu.

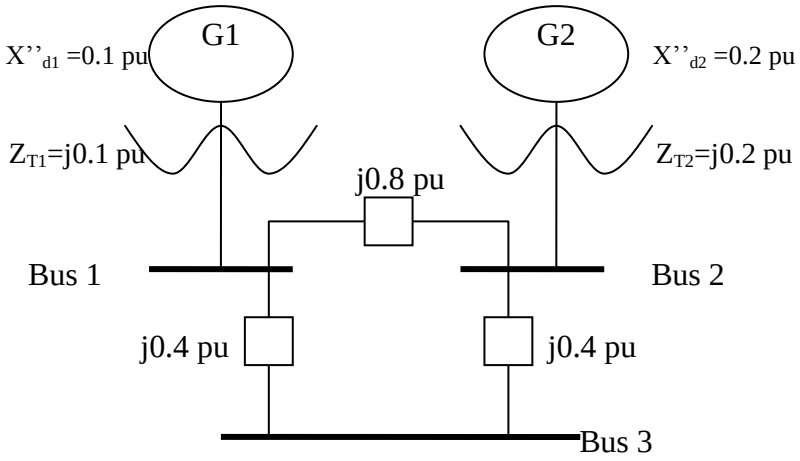

Fig. 12