

**Georgia Institute of Technology**  
**School of Electrical and Computer Engineering**

EE4321

Power System Engineering

Spring 2009

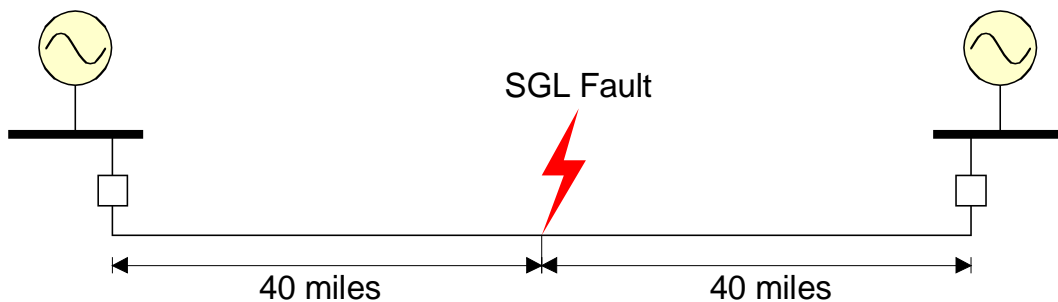
Homework Assignment #1  
Due January 20, 2009

**Problem P1:** A three-phase transmission line connects two electrical power systems as in Figure P1a. The line configuration is shown in Figure P1b. Each phase conductor has the following parameters:  $r = 0.12$  ohms/mile and  $GMR = 0.035$  feet. The operating voltage of the line is 115kV line to line. The line length is 80 miles and the soil resistivity is 500 ohm-meters. Each of the power systems is represented as an equivalent source that is solidly grounded and with the following sequence impedances:

$$Z_1 = Z_2 = j0.1 \text{ pu}, \quad Z_0 = j0.06 \text{ pu}$$

The voltage sources behind the equivalent impedances are in phase.

- (a) Compute the fault currents for a three-phase fault at the middle of the line using symmetrical components.
- (b) Compute the fault currents for a three-phase fault at the middle of the line using direct phase analysis.
- (c) Compare the results from (a) and (b). State your own conclusions.



**Figure P1a**

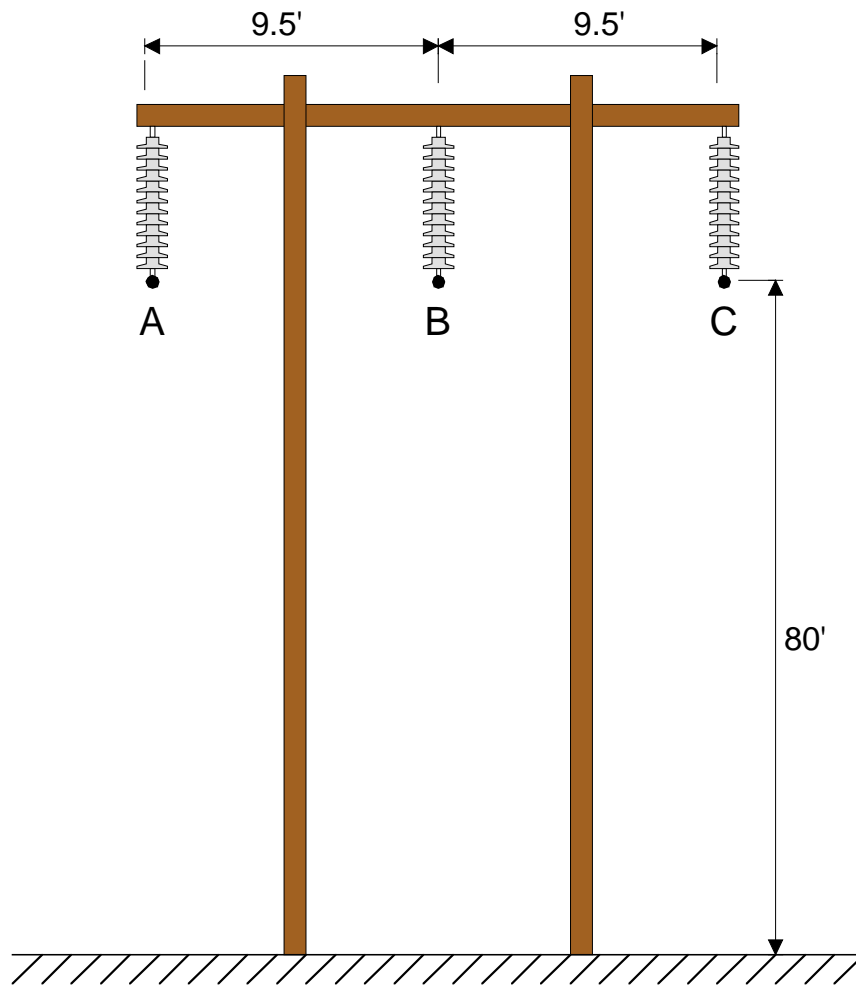


Figure P1b