HOMEWORK # 3 - March 17, 2020

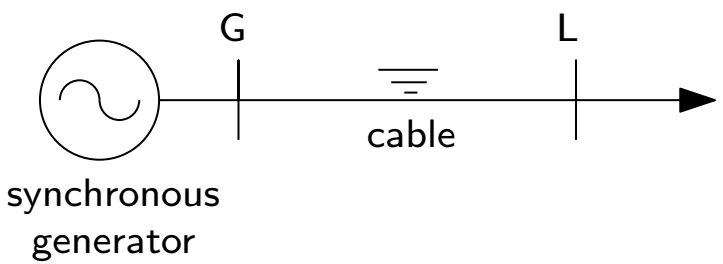
Part 1

Demonstrate the results shown in slides # 43-45 of the lecture "Analysis of unbalanced systems : the symmetrical components".

group	fault	slide #
MaEM	single line to ground	43
MaEL	double line to ground	45

Part 2

Consider the system shown below. A solid fault of the type specified in the above table takes place at bus L.



Using the technique described in the above slides compute :
- the voltage (in kV) between each phase and the ground at bus L
- the current (in A) in each phase of the cable
- the current in the fault (resp. each fault)

Generator :

- 5 MVA, 6 kV, connected in star, neutral grounded through a resistance of 1 Ω
- $R_+ \simeq 0$, $X_+ = X'' = 0.15$ pu
- $R_- = 0.01$ pu, $X_- = 0.15$ pu
- $R_o \simeq 0$, $X_o = 0.04$ pu

Cable :

- 6 kV, three-phase, single core with grounded shield
- $R_+ = 0.9\ \Omega$, $X_+ = 1.5\ \Omega$, shunt susceptance neglected
- $R_o = 4\ \Omega$, $X_o = 3\ \Omega$, shunt susceptance neglected

Load : connected in triangle

Operating point :

- (three-phase) power consumed by load : 2 MW / 0.8 Mvar
- voltage at bus L : 6 kV

Make all calculations in per unit on the base :
single-phase power : 1 *MVA* *phase-to-neutral voltage :* $6/\sqrt{3}$ *kV*

E-mail your report to t.vancutsem@uliege.be no later than Sat March 28.

You will present it on March 31st (dedicated course)