B22228

Q:

For the system as modelled in tutorial, single line diagram given below, comment on the current contributions of the two sources during fault condition in table 2.

Table 1: Given Data

Fault Type	ABC
Fault Location	10 km from source
Fault Resistance R_f	0.005 Ω

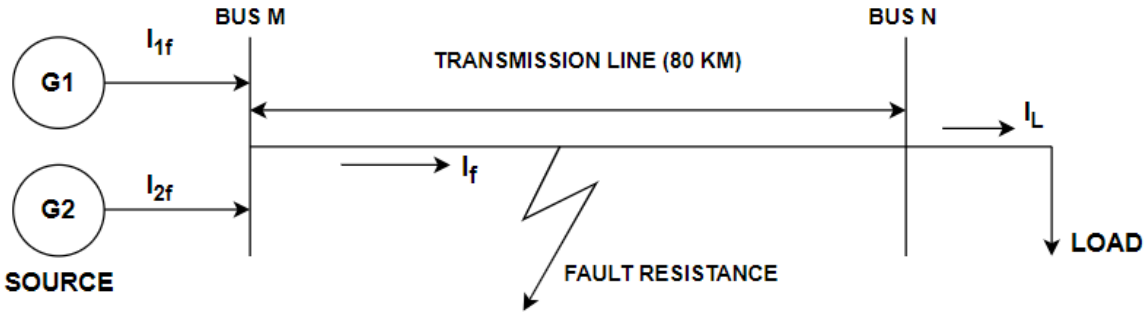


Table 2: During Fault (Fill the blank rows below).

Source	**Generator (G_1)**	**Generator (G_2)**
Source Resistance	R_{s1}= 0.8929 Ω	R_{s2}= 10 Ω
Fault current I_{1f}	2.009e+03	---
Fault current I_{2f}	---	1.053e+03
Source reactance (L)	L_{G1}=0.01658 H	L_{G2}=0.01658 H

G1 contributes **2.009e+03 A**, which is higher due to its lower source resistance.

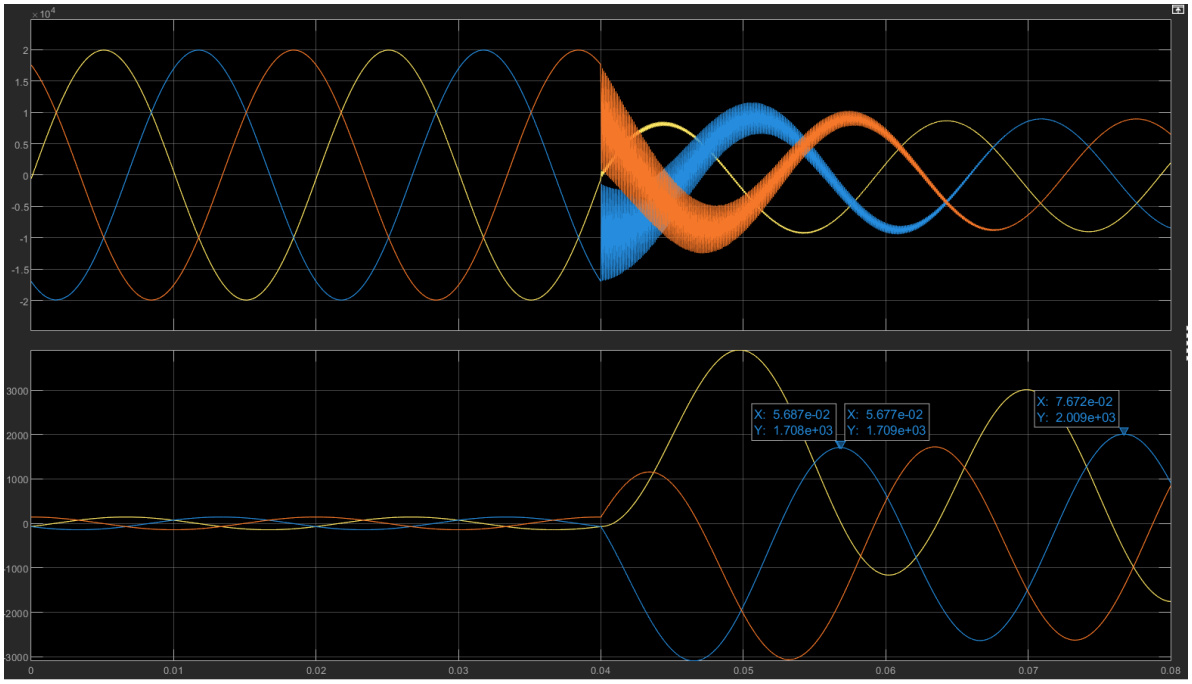
G2 contributes **1.053e+03 A**, which is lower because of its higher source resistance

Briefly comment on the following question:

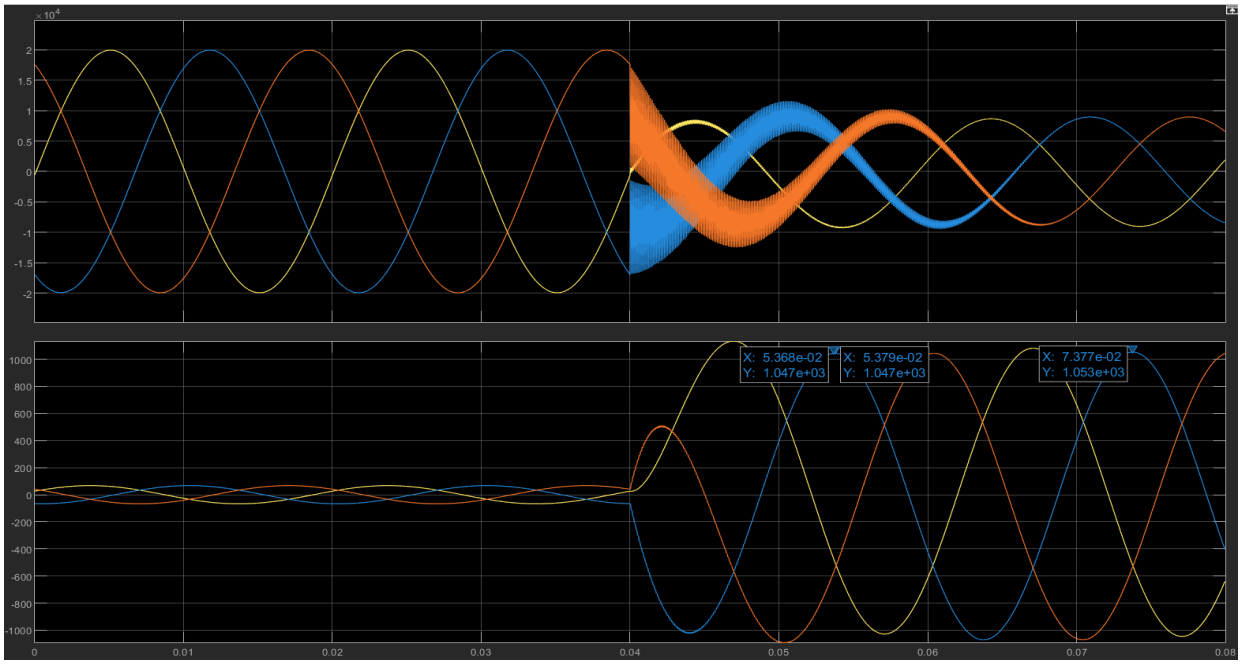
What is the effect of change in the fault location from source terminal Bus M to the fault location defined in the Table 1?

Answer :

V and I graphs for generator 1



V and I graphs for generator 2



- **G1 Current Contribution**: G1 contributes **2.009e+03 A** to the fault. This high fault current contribution is expected since G1 has a lower source resistance (**0.8929 Ω**), allowing more current to flow through the fault path.
- **G2 Current Contribution**: G2, with a higher source resistance (**10 Ω**), contributes a lower fault current of **1.053e+03 A**. The higher resistance in G2's circuit limits the current flow, resulting in a smaller contribution to the overall fault current.

Fault Location Impact:

- Moving the fault location **10 km from the source** increases the impedance of the fault path. This impedance, combined with the fault resistance (0.005 Ω), directly impacts the magnitude of the fault current. The fault current from **both G1 and G2 decreases** as the fault moves further away from the source due to the increase in total impedance.
- The **voltage drop** seen in the scopes for G1 and G2 also reflects this change in fault location. Closer fault locations would result in higher fault currents, and as the fault is farther from the source, the system's total impedance rises, reducing the overall fault current contributions.

CONCLUSION:

- **G1** provides a higher fault current contribution due to its lower source resistance, while **G2**, with a higher source resistance, contributes less to the fault current.
- The change in fault location from the source bus to a point 10 km away results in reduced fault currents due to the increased impedance of the transmission line.

V and I graphs at load :