

$$Xl := 0.37$$

$$L1 := 120$$

$$L2 := 30$$

Trasformatore T1 d-yg

$$Ant1 := 40 \cdot 10^6$$

$$kt1 := \frac{15}{130}$$

$$vcct1 := 0.12$$

Trasformatore T2 yg-yg

$$Ant2 := 30 \cdot 10^6$$

$$kt2 := \frac{6}{130}$$

$$vcct2 := 0.15$$

Generatore G1

$$Ang1 := 30 \cdot 10^6$$

$$Vng1 := 15000$$

$$Xdg1 := 0.3$$

$$Xog1 := 0.1$$

$$Xig1 := 0.3$$

Generatore G2

$$Ang2 := 20 \cdot 10^6$$

$$Vng2 := 6000$$

$$Xdg2 := 0.25$$

$$Xog2 := 0.11$$

$$Xig2 := 0.25$$

Svolgimento

$$\text{Arif} := 30 \cdot 10^6$$

$$\text{Zrif}_{130} := \frac{130000^2}{\text{Arif}}$$

$$\text{Zrif}_{130} = 563.333$$

$$\text{Zrif}_{15} := \frac{15000^2}{\text{Arif}}$$

$$\text{Zrif}_{15} = 7.5$$

$$\text{Zrif}_6 := \frac{6000^2}{\text{Arif}}$$

$$\text{Zrif}_6 = 1.2$$

Linea L1 e L2

$$\text{x}_{l1} := \text{X}_{l1} \cdot \frac{\text{L1}}{\text{Zrif}_{130}}$$

$$\text{x}_{l1} = 0.079$$

$$\text{x}_{l2} := \text{X}_{l1} \cdot \frac{\text{L2}}{\text{Zrif}_{130}}$$

$$\text{x}_{l2} = 0.02$$

Generatore G1 e G2

$$\text{x}_{dg1} := \text{X}_{dg1} \cdot \frac{\text{Arif}}{\text{Ang1}}$$

$$\text{x}_{dg1} = 0.3$$

$$\text{x}_{ig1} := \text{X}_{ig1} \cdot \frac{\text{Arif}}{\text{Ang1}}$$

$$\text{x}_{ig1} = 0.3$$

$$\text{x}_{og1} := \text{X}_{og1} \cdot \frac{\text{Arif}}{\text{Ang1}}$$

$$\text{x}_{og1} = 0.1$$

$$\text{x}_{dg2} := \text{X}_{dg2} \cdot \frac{\text{Arif}}{\text{Ang2}}$$

$$\text{x}_{dg2} = 0.375$$

$$\text{x}_{ig2} := \text{X}_{ig2} \cdot \frac{\text{Arif}}{\text{Ang2}}$$

$$\text{x}_{ig2} = 0.375$$

$$\text{x}_{og2} := \text{X}_{og2} \cdot \frac{\text{Arif}}{\text{Ang2}}$$

$$\text{x}_{og2} = 0.165$$

Trasformatori T1 e T2

$$\text{x}_{t1} := \text{vcct1} \cdot \frac{\text{Arif}}{\text{Ant1}}$$

$$\text{x}_{t1} = 0.09$$

$$\text{x}_{t2} := \text{vcct2} \cdot \frac{\text{Arif}}{\text{Ant2}}$$

$$\text{x}_{t2} = 0.15$$

$$i := \sqrt{-1}$$

$$Z_{deq} := i \cdot \left[(x_{dg1} + x_{t1} + x_{l1})^{-1} + (x_{l2} + x_{t2} + x_{dg2})^{-1} \right]^{-1} \quad Z_{deq} = 0.252i$$

$$Z_{ieq} := i \cdot \left[(x_{ig1} + x_{t1} + x_{l1})^{-1} + (x_{l2} + x_{t2} + x_{ig2})^{-1} \right]^{-1} \quad Z_{ieq} = 0.252i$$

$$Z_{oeq} := i \cdot \left[(x_{t1} + 3 \cdot x_{l1})^{-1} + (3 \cdot x_{l2} + x_{t2} + x_{og2})^{-1} \right]^{-1} \quad Z_{oeq} = 0.174i$$

Guasto Trifase

$$I_{cct} := \frac{1}{Z_{deq}} \quad I_{cct} = -3.969i \quad I_{rif} := \frac{A_{rif}}{\sqrt{3} \cdot 130000} \quad I_{rif} = 133.235$$

$$I_{cct} \cdot I_{rif} = -528.794i$$

Guasto monofase

$$I_{ccm} := \frac{3}{Z_{deq} + Z_{ieq} + Z_{oeq}} \quad I_{ccm} = -4.423i \quad I_{ccm} \cdot I_{rif} = -589.317i$$

$$i := \sqrt{-1}$$

Guasto bisafe

$$I_d := \frac{1}{Z_{deq} + Z_{ieq}} \quad I_i := -I_d \quad I_o := 0 \quad \alpha := e^{i \cdot \frac{2\pi}{3}}$$

$$\begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} := \begin{bmatrix} 1 & 1 & 1 \\ 1 & \alpha^2 & \alpha \\ 1 & \alpha & \alpha^2 \end{bmatrix} \cdot \begin{bmatrix} I_o \\ I_d \\ I_i \end{bmatrix} \quad \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} 0 \\ -3.437 \\ 3.437 \end{bmatrix} \quad \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} \cdot I_{rif} = \begin{bmatrix} 0 \\ -457.949 \\ 457.949 \end{bmatrix}$$