

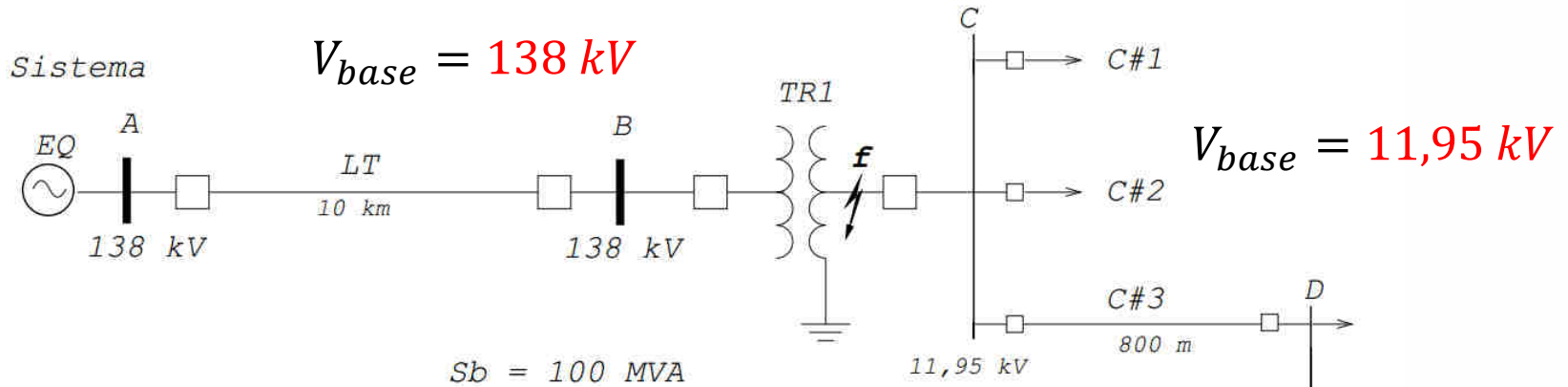
Sistemas Elétricos de Potência

Aula 06-P2 – Cálculo de Curto-circuito **Bifásico** em um Sistema com **Co-gerador**

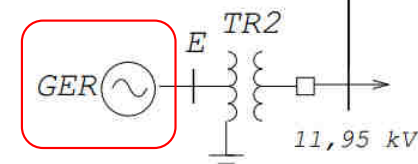


Prof. Heverton Augusto Pereira
heverton.pereira@ufv.br

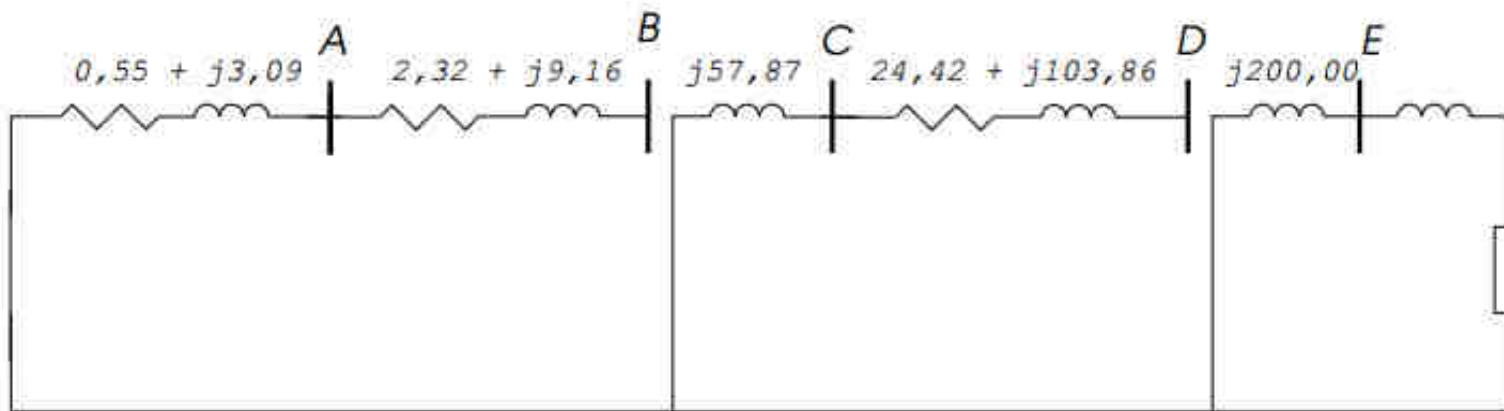
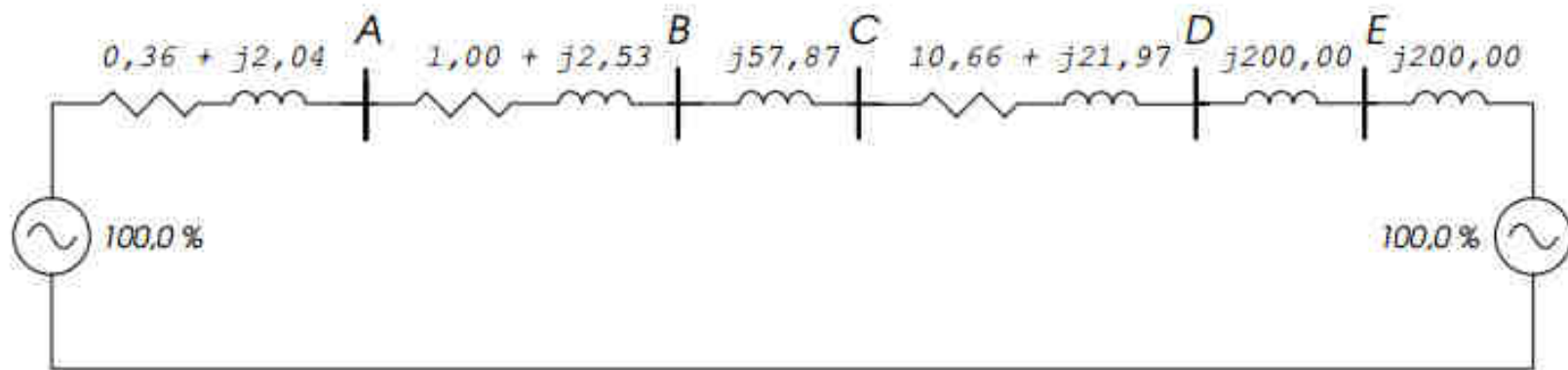
Sistema com Co-gerador



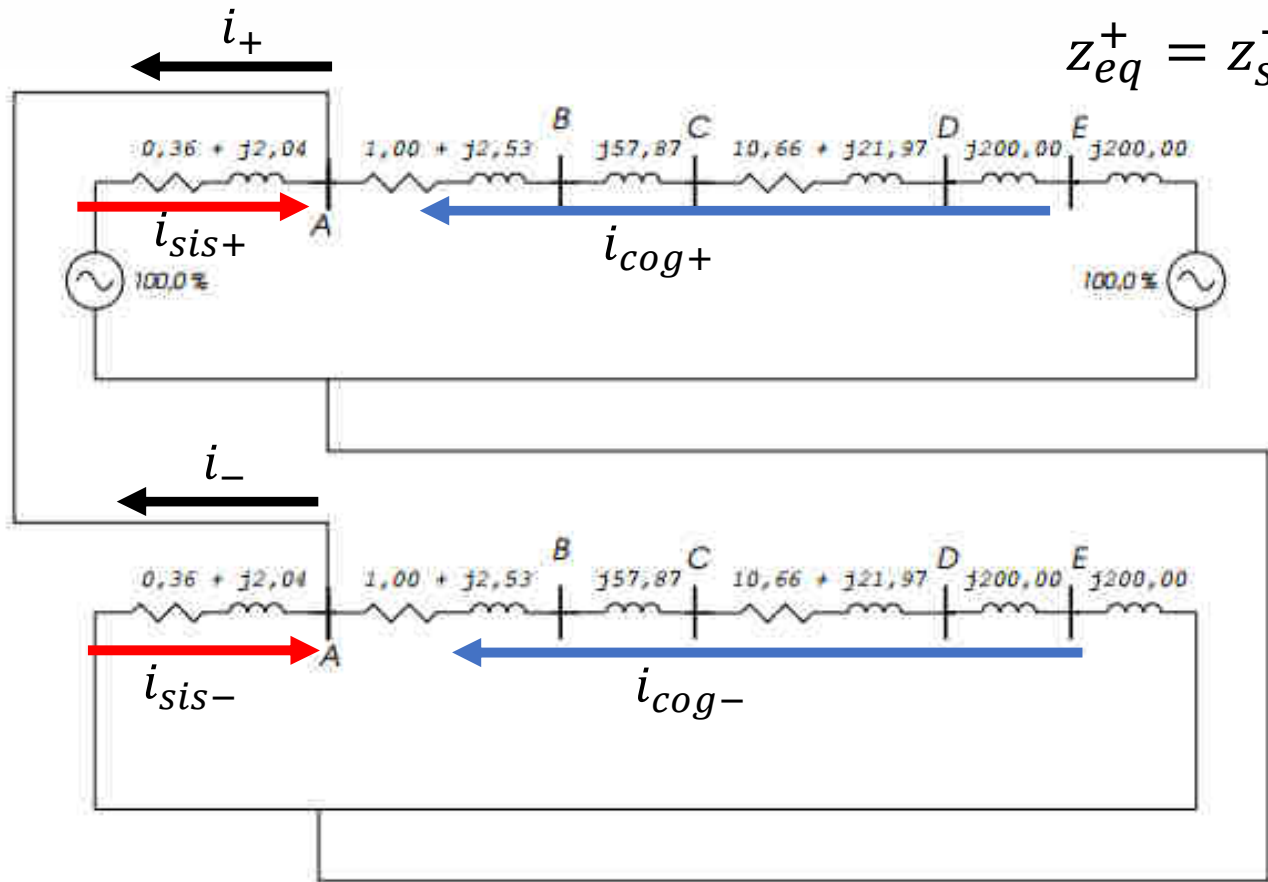
A	Curto-circuito trifásico = 4.808 MVA -80° Curto-circuito monofásico = 4.109 MVA -80°
LT	$z_+ = 0,1902 + j0,4808 \text{ ohm/km}$ $z_0 = 0,4414 + j1,7452 \text{ ohm/km}$
TR1	138,0/11,95 kV - 15 MVA - j8,68 %
C#3	$z_+ = 0,1903 + j0,3922 \text{ ohm/km}$ $z_0 = 0,4359 + j1,8540 \text{ ohm/km}$
TR2	11,95/11,95 kV - 2,5 MVA - j5,0 %
GER	11,95 kV - 10,0 MVA - $x_d' = j20,0 \%$



Preparação dos dados



Curto-circuito Bifásico – Barra A



$$z_{eq}^+ = z_{sis}^+ // z_{cog}^+ = 2,06 \angle 80,03^\circ \%$$

$$z_{eq}^+ = z_{eq}^-$$

$$i_+ = \frac{100}{z_{eq}^+ + z_{eq}^-}$$

$$i_+ = \frac{100}{2 \times 2,06 \angle 80,03}$$

$$i_+ = 24,24 \angle -80,03^\circ \text{ pu}$$

Curto-circuito Bifásico – Barra A

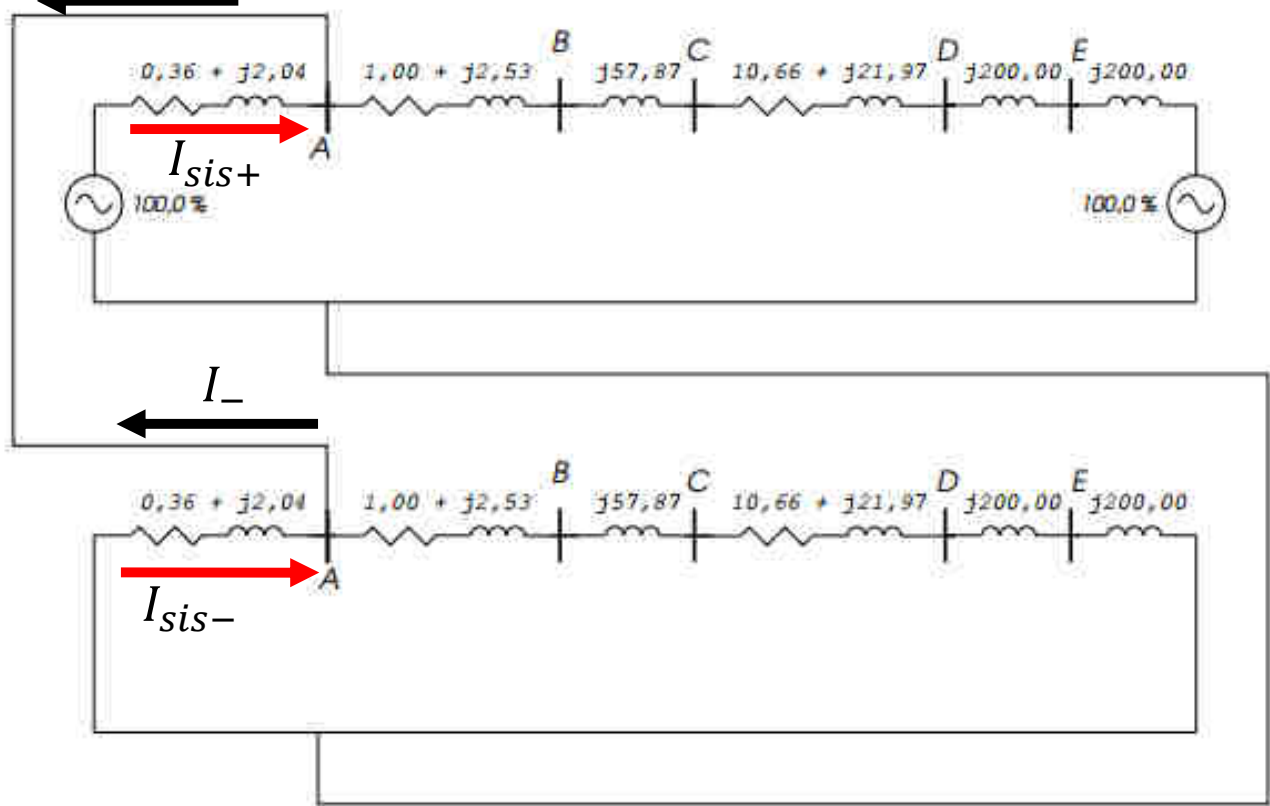
$$I_{base}^A = \frac{100 \times 10^6}{\sqrt{3} \times 138 \times 10^3} = 418,37 \text{ A}$$

$$I_+ = 24,24 \angle -80,03 \times 418,37 = 10.141 \angle -80,03^\circ \text{ A}$$

$$\begin{bmatrix} I_A^A \\ I_B^A \\ I_C^A \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ a^2 & a & 1 \\ a & a^2 & 1 \end{bmatrix} \begin{bmatrix} I_+^A \\ I_-^A \\ I_0^A \end{bmatrix} \quad \begin{bmatrix} I_A^A \\ I_B^A \\ I_C^A \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ a^2 & a & 1 \\ a & a^2 & 1 \end{bmatrix} \begin{bmatrix} 10.141 \angle -80,03^\circ \\ -10.141 \angle -80,03^\circ \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} I_A^A \\ I_B^A \\ I_C^A \end{bmatrix} = \begin{bmatrix} 0 \\ 17.565 \angle -170^\circ \\ 17.5645 \angle 9,97^\circ \end{bmatrix}$$

Curto-circuito Bifásico – Barra A – Contribuição do Sistema



$$I_{sis+} = -I_{sis-}$$

$$I_{sis+} = 10.141 \angle -80,03 \frac{482,51 \angle 88,62}{2,07 \angle 79,99 + 482,51 \angle 88,62} = 10.098 \angle -79,99^\circ \text{A}$$

Curto-circuito Bifásico – Barra A – Contribuição do Sistema

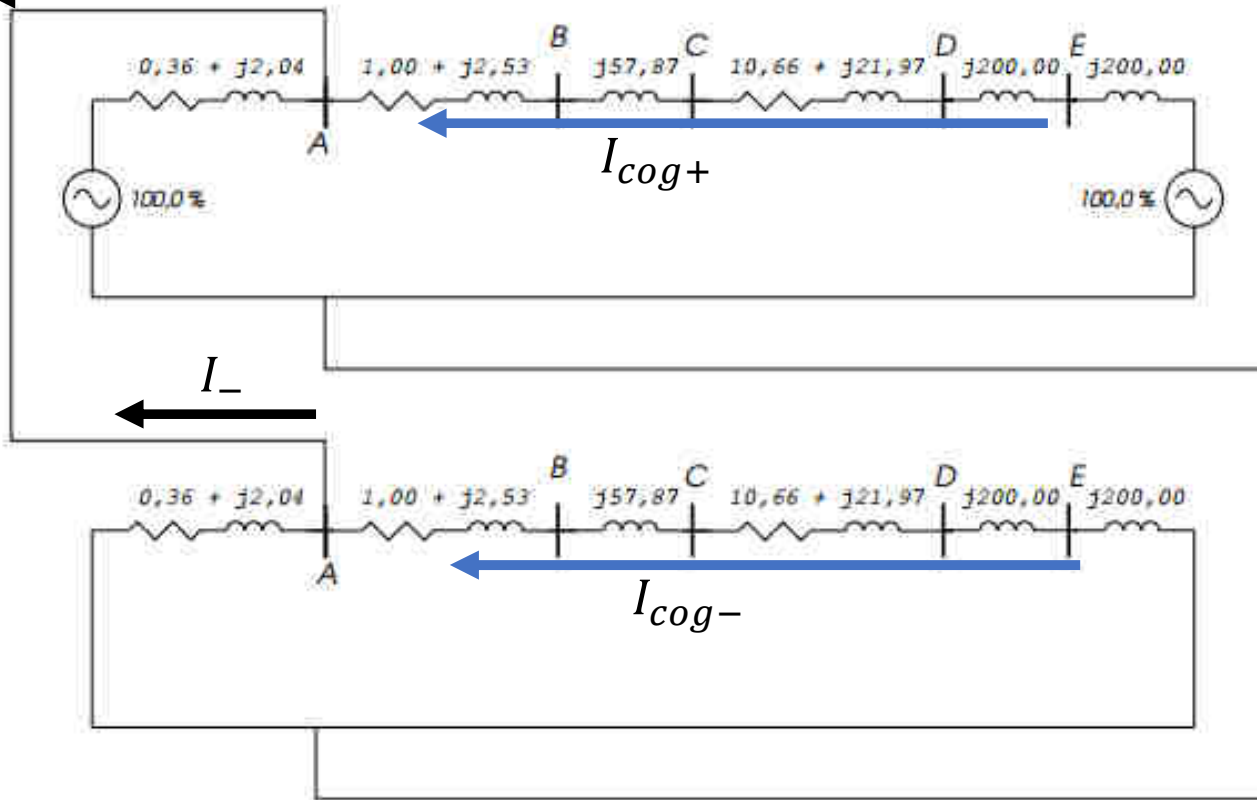
$$I_{sis+} = 10.098 \angle -79,99^\circ A$$

$$I_{sis+} = -I_{sis-}$$

$$\begin{bmatrix} I_{sis_A}^A \\ I_{sis_B}^A \\ I_{sis_C}^A \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ a^2 & a & 1 \\ a & a^2 & 1 \end{bmatrix} \begin{bmatrix} I_{sis+}^A \\ I_{sis-}^A \\ I_{sis0}^A \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ a^2 & a & 1 \\ a & a^2 & 1 \end{bmatrix} \begin{bmatrix} 10.098 \angle -79,99^\circ \\ -10.098 \angle -79,99^\circ \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} I_{sis_A}^A \\ I_{sis_B}^A \\ I_{sis_C}^A \end{bmatrix} = \begin{bmatrix} 0 \\ 17.490 \angle -169,99^\circ \\ 17.490 \angle 10,01^\circ \end{bmatrix} A$$

I_+ Curto-circuito Bifásico – Barra A – Contribuição do Co-Gerador



$$I_{cog+} = -I_{cog-}$$

$$I_{cog+} = 10.141 \angle -80,03 \frac{2,07 \angle 79,99}{2,07 \angle 79,99 + 482,51 \angle 88,62} = 43,36 \angle -88,62^\circ \text{A}$$

Curto-circuito Bifásico – Barra A – Contribuição do Co-Gerador

$$I_{cog+} = 43,36 \angle -88,62^\circ \text{ A}$$

$$I_{cog+} = -I_{cog-}$$

$$\begin{bmatrix} I_{cog_A}^A \\ I_{cog_B}^A \\ I_{cog_C}^A \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ a^2 & a & 1 \\ a & a^2 & 1 \end{bmatrix} \begin{bmatrix} I_{cog+}^A \\ I_{cog-}^A \\ I_{cog0}^A \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ a^2 & a & 1 \\ a & a^2 & 1 \end{bmatrix} \begin{bmatrix} 43,36 \angle -88,62^\circ \\ -43,36 \angle -88,62^\circ \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} I_{cog_A}^A \\ I_{cog_B}^A \\ I_{cog_C}^A \end{bmatrix} = \begin{bmatrix} 0 \\ 75,09 \angle -178,62^\circ \\ 75,09 \angle 1,38^\circ \end{bmatrix} \text{ A}$$



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Obrigado!

Heverton Augusto Pereira

Prof. Departamento de Engenharia Elétrica | UFV

Coordenador da Gerência de Especialistas em Sistemas Elétricos de Potência | Gesep

Membro do Programa de Pós-Graduação em Engenharia Elétrica | PPGEL/CEFET-MG

E-mail: heverton.pereira@ufv.br