Estrela desequilibrado com neutro

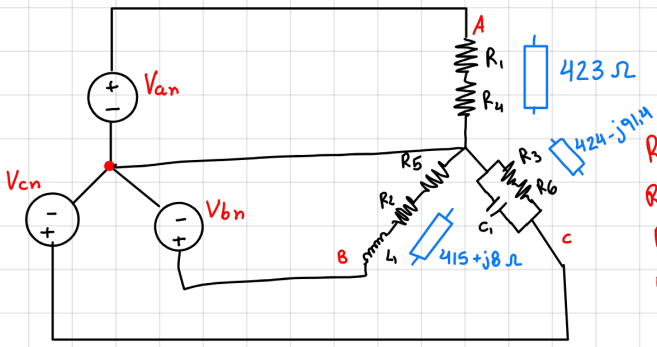
CBA

Uma Fonte

$V_{an} = 130,7 \angle 0°$ $V_{AB} = 226,3 \angle -30°$

$V_{bn} = 130,7 \angle +120°$ $V_{BC} = 226,3 \angle 90°$

$V_{cn} = 130,7 \angle -120°$ $V_{CA} = 226,3 \angle -150°$



$R_1 = 206,9\ \Omega$

$R_2 = 210,1\ \Omega$

$R_3 = 212,2\ \Omega$

$R_4 = 216,0\ \Omega$

$R_5 = 204,6\ \Omega$

$R_6 = 212,5\ \Omega$

$C_1 = 29\ \mu F \rightarrow \frac{1}{j\omega C} = \frac{1}{j2\pi f.29.10^{-6}} = -j91,4\ \Omega$

$L_1 = 21,5\ mH \rightarrow j\omega L = j.377.21,5.10^{-3} = j8,1\ \Omega$

$Z_a = 423\ \Omega \rightarrow 423 \angle 0°$

$Z_b = 415 + j8\ \Omega \rightarrow 415 \angle 1,1°$

$Z_c = 424 - j91,4\ \Omega \rightarrow 433 \angle -12,°$

Correntes $I_L = I_F$

$I_a = \frac{130,7 \angle 0}{423 \angle 0°} = 0,308 \angle 0°\ A$

$I_b = \frac{130,7 \angle 120°}{415 \angle 1,1°} = 0,314 \angle 118,9\ A$

$I_c = \frac{130,7 \angle -120}{433 \angle -12°} = 0,301 \angle -108°\ A$

Potencia

Uma carga

$S_a = 130,7 \angle 0 \cdot 0,308 \angle 0° = 40,25 \angle 0° \rightarrow$ **40,25 + j0 VA**

$S_b = 130,7 \angle 120 \cdot 0,314 \angle -118,9 = 41,03 \angle 1,09° \rightarrow$ **41,03 + j 0,78 VA**

$S_c = 130,7 \angle 120 \cdot 0,301 \angle 108° = 39,34 \angle -11,9° \rightarrow$ **38,48 - j8,17 VA**

$S_T = (S_a + S_b + S_c)$

$S_T = (119,76 - j\,7,39)\ VA$

$P = 119,76\ W$

$Q = 7,39\ VAR$

$Fp = \cos(-3,53)$

$Fp = 0,998$ (capacitivo).

Potencia na fonte

$P_a = -(V_{an} \cdot I_a^*) = -(40,25 + j0)\ VA$

$P_b = -(V_{bn} \cdot I_b^*) = -(41,03 + j0,78)\ VA$

$P_c = -(V_{cn} \cdot I_c^*) = -(38,48 - j8,17)\ VA$

$P_T = -(119,76 - j\,7,39)\ VA$

Corrente no neutro

$I_n = -(I_a + I_b + I_c)$

$I_n = -(0,308 \angle 0° + 0,314 \angle 118,9 + 0,301 \angle -108°)$

$I_n = -(0,0642 \angle -10)\ A$

$I_n = 0,0642 \angle 170°\ A$

Estrela desequilibrado s/ n.

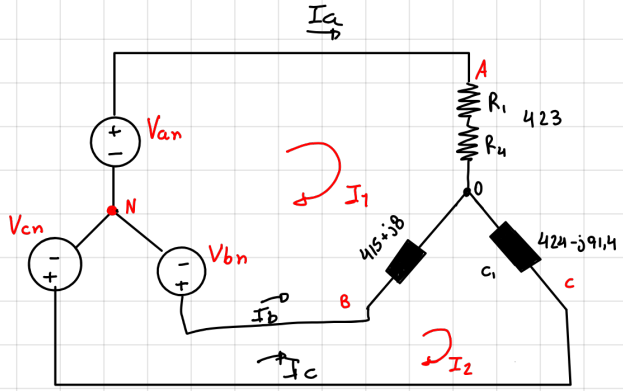
CBA

Na Fonte

$V_{an} = 130,7 \angle 0°$ $V_{AB} = 226,3 \angle -30°$

$V_{bn} = 130,7 \angle +120°$ $V_{BC} = 226,3 \angle 90°$

$V_{cn} = 130,7 \angle -120°$ $V_{CA} = 226,3 \angle -150°$



(M1)

$-V_{an} + 423 I_1 + 415 + j8 (I_1 - I_2) + V_{bn} = 0$

$(838 + j8) I_1 + (415 - j8) I_2 = 226,3 \angle -30°$

(M2)

$-V_{bn} + 415 + j8 (I_2 - I_1) + 424 - j91,4 I_2 + V_{cn} = 0$

$(839 - j83,4) I_2 + (-415 - j8) I_1 = 226,3 \angle 90°$

$$\begin{bmatrix} (838+j8) & -(415+j8) \\ -(415+j8) & (839-j83,4) \end{bmatrix} = \begin{bmatrix} 226 \angle -30° \\ 226 \angle 90° \end{bmatrix} =$$

$I_1 = 0,287 \angle 0,95°$ $I_a = 0,287 \angle 0,95°$

$I_2 = 0,307 \angle 68,28°$ $I_b = 0,329 \angle 121,72°$

$I_c = 0,307 \angle -112°$

$V_{AO} = I_a \cdot Z_a = 0,287 \angle 0,95° \cdot 423 \angle 0°$

$V_{AO} = 121,4 \angle 0,95°$ V

$V_{BO} = I_b \cdot Z_b = 0,329 \angle 121,72° \cdot 415 \angle 1,1° =$

$V_{BO} = 136,5 \angle 122,82°$ V

$V_{CO} = I_c \cdot Z_c = 0,307 \angle -112° \cdot 433 \angle -12°$

$V_{CO} = 132,93 \angle -124°$ V

$V_{NO} = V_{an} - V_{ao}$

$V_{NO} = 9,53 \angle -12,1°$ V

= Não tem In

Potencia nas Cargas

$S_a = V_{AO} \cdot I_a^* \rightarrow 121,4 \angle 0,95° \cdot 0,287 \angle -0,95°$

$S_a = 34,84 \angle 0° \rightarrow 34,84 + j0$ VA

$S_b = V_{BO} \cdot I_b^* \rightarrow 136,5 \angle 122,82° \cdot 0,329 \angle -121,72°$

$S_b = 44,90 \angle 1,81° \rightarrow 44,88 + j1,42$ VA

$S_c = V_{CO} \cdot I_c^* \rightarrow 132,93 \angle -124° \cdot 0,307 \angle 112°$

$S_c = 40,80 \angle -11,9° \rightarrow 39,91 - j8,48$ VA

$S_T = (S_a + S_b + S_c)$

$S_T = 119,64 - j6,99$ VA

P (W) Q (VAR)

$Fp = \cos(-3,34°) = 0,998$ (capacitivo).

Potência nas Fases

$S_{aF} = -(34,84 + j0)$ VA

$S_{bF} = -(44,88 + j1,42)$ VA

$S_{cF} = -(39,91 - j8,48)$ VA

$S_{TF} = -(S_{aF} + S_{bF} + S_{cF})$

$S_{TF} = -(119,64 - j6,99)$ VA