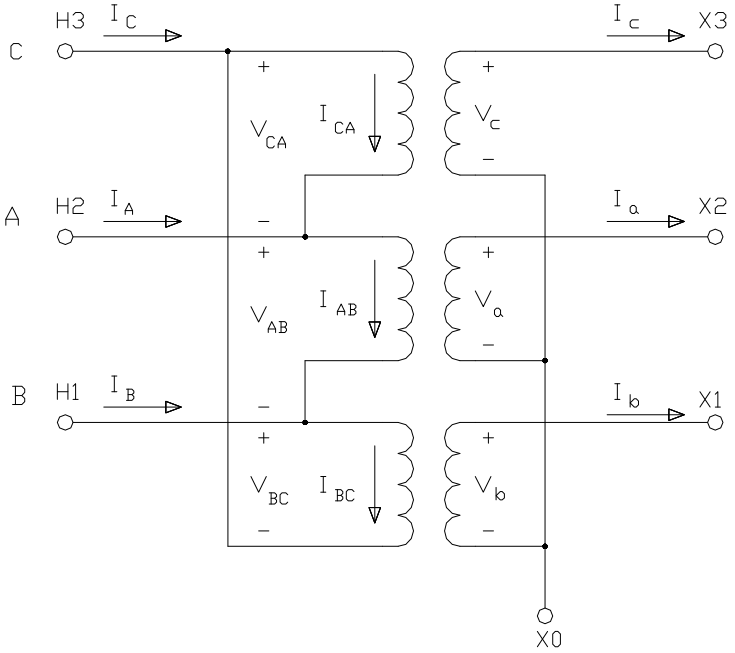
VOLTAGE AND CURRENT SHIFTS IN DELTA-WYE TRANSFORMER



Define: $a := e^{j \cdot 120 \cdot deg}$ $MVA := volt \cdot amp \cdot 10^6$ $kVA \equiv kV \cdot A$

Voltage ratio $N := \frac{115}{12.47}$ Turns ratio $n := N \cdot \sqrt{3}$ $n = 15.973$

Base power $P_B := 12000kVA$

	Primary		Secondary	
Base voltage	$E_{Bp} := 115kV$		$E_{Bs} := \frac{E_{Bp}}{N}$	$E_{Bs} = 1.247 \times 10^4 \cdot V$
Base current	$I_{Bp} := \frac{P_B}{\sqrt{3} \cdot E_{Bp}}$	$I_{Bp} = 60.245 \cdot amp$	$I_{Bs} := \frac{P_B}{\sqrt{3} \cdot E_{Bs}}$	$I_{Bs} = 555.6 \cdot amp$

Primary Voltages

$V_A := \frac{115}{\sqrt{3}} \cdot e^{j \cdot 0 \cdot deg} \cdot kV$ $V_B := \frac{115}{\sqrt{3}} \cdot e^{-j \cdot 120 \cdot deg} \cdot kV$ $V_C := \frac{115}{\sqrt{3}} \cdot e^{j \cdot 120 \cdot deg} \cdot kV$

$V_{CA} := V_C - V_A$ $V_{AB} := V_A - V_B$ $V_{BC} := V_B - V_C$

Secondary Voltages

$V_a := \frac{1}{n} \cdot V_{AB}$ $V_b := \frac{1}{n} \cdot V_{BC}$ $V_c := \frac{1}{n} \cdot V_{CA}$

$V_a = (6235 + 3599.8i) \cdot volt$ $V_b = -7199.6i \cdot volt$ $V_c = (-6235 + 3599.8i) \cdot volt$

$|V_a| = 7.2 \cdot kV$ $|V_b| = 7.2 \cdot kV$ $|V_c| = 7.2 \cdot kV$

$\arg(V_a) = 30 \cdot deg$ $\arg(V_b) = -90 \cdot deg$ $\arg(V_c) = 150 \cdot deg$

Secondary Currents

$I_a := 1000 \cdot e^{j \cdot 0 \cdot deg} amp$ $I_b := 1000 \cdot e^{-j \cdot 120 \cdot deg} \cdot amp$ $I_c := 1000 \cdot e^{j \cdot 120 \cdot deg} \cdot amp$

Primary Currents

$I_{AB} := \frac{1}{n} \cdot I_a$ $I_{BC} := \frac{1}{n} \cdot I_b$ $I_{CA} := \frac{1}{n} \cdot I_c$

$I_{AB} = 62.6 \cdot amp$ $I_{BC} = (-31.3 - 54.2i) \cdot amp$ $I_{CA} = (-31.3 + 54.2i) \cdot amp$

$|I_{AB}| = 62.6 \cdot amp$ $|I_{BC}| = 62.6 \cdot amp$ $|I_{CA}| = 62.6 \cdot amp$

$\arg(I_{AB}) = 0 \cdot deg$ $\arg(I_{BC}) = -120 \cdot deg$ $\arg(I_{CA}) = 120 \cdot deg$

$I_A := I_{AB} - I_{CA}$ $I_B := I_{BC} - I_{AB}$ $I_C := I_{CA} - I_{BC}$

$I_A = (93.9 - 54.2i) \cdot amp$ $I_B = (-93.9 - 54.2i) \cdot amp$ $I_C = 108.4i \cdot amp$

$|I_A| = 108.43 \cdot amp$ $|I_B| = 108.43 \cdot amp$ $|I_C| = 108.43 \cdot amp$

$\arg(I_A) = -30 \cdot deg$ $\arg(I_B) = -150 \cdot deg$ $\arg(I_C) = 90 \cdot deg$

$k := 0 .. 5$

$VSr_k :=$

$0 \cdot volt$
$Re(V_a)$
$0 \cdot volt$
$Re(V_b)$
$0 \cdot volt$
$Re(V_c)$

$VSx_k :=$

$0 \cdot volt$
$Im(V_a)$
$0 \cdot volt$
$Im(V_b)$
$0 \cdot volt$
$Im(V_c)$

$VPr_k :=$

$0 \cdot volt$
$Re(V_A)$
$0 \cdot volt$
$Re(V_B)$
$0 \cdot volt$
$Re(V_C)$

$VPx_k :=$

$0 \cdot volt$
$Im(V_A)$
$0 \cdot volt$
$Im(V_B)$
$0 \cdot volt$
$Im(V_C)$

$|I_c| = 1 \times 10^3 \cdot amp$

$ISr_k :=$

$0 \cdot amp$
$Re(I_a)$
$0 \cdot amp$
$Re(I_b)$
$0 \cdot amp$
$Re(I_c)$

$ISx_k :=$

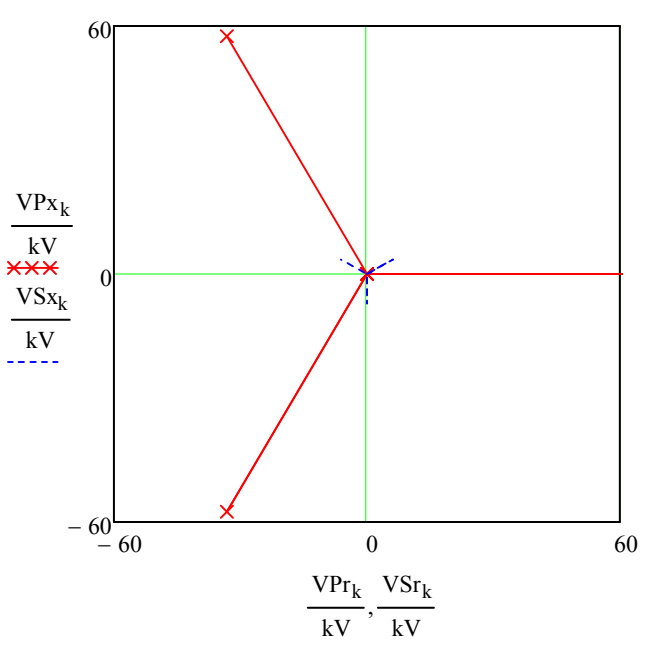
$0 \cdot amp$
$Im(I_a)$
$0 \cdot amp$
$Im(I_b)$
$0 \cdot amp$
$Im(I_c)$

$IPr_k :=$

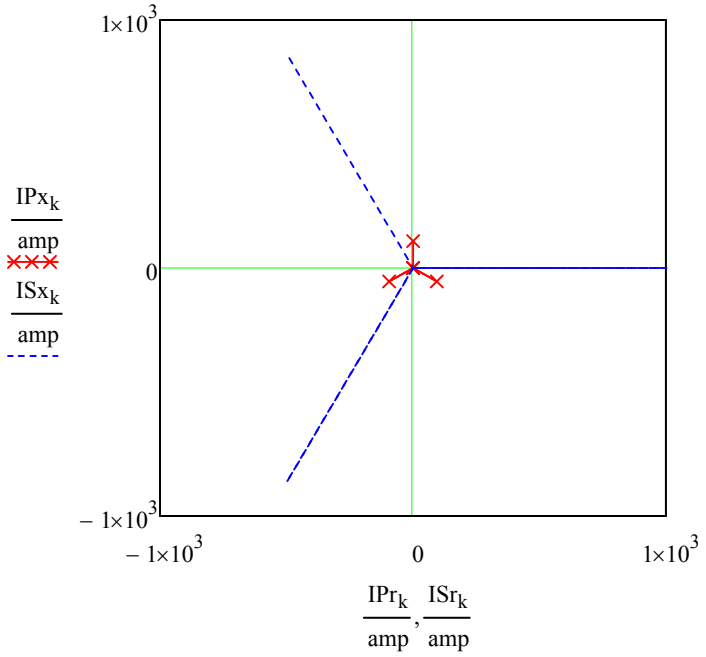
$0 \cdot amp$
$Re(I_A)$
$0 \cdot amp$
$Re(I_B)$
$0 \cdot amp$
$Re(I_C)$

$IPx_k :=$

$0 \cdot amp$
$Im(I_A)$
$0 \cdot amp$
$Im(I_B)$
$0 \cdot amp$
$Im(I_C)$



Voltages



Currents