IIT ROORKEE

NPTEL ONLINE CERTIFICATION COURSE

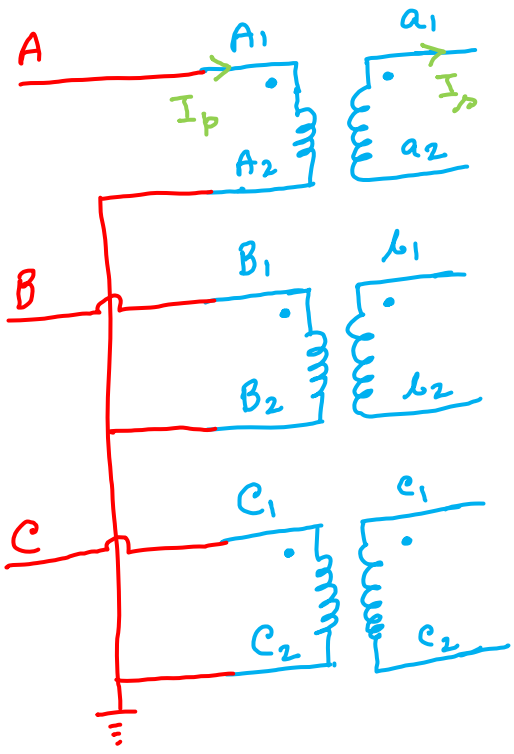
Computer aided power system analysis

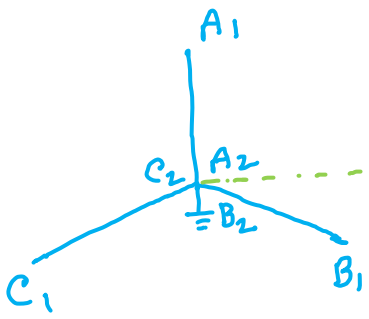
Fault Analysis (Contd.)

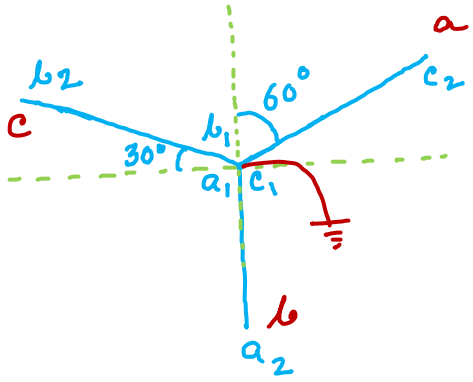
Prof. Biswarup Das
Department of Electrical Engineering

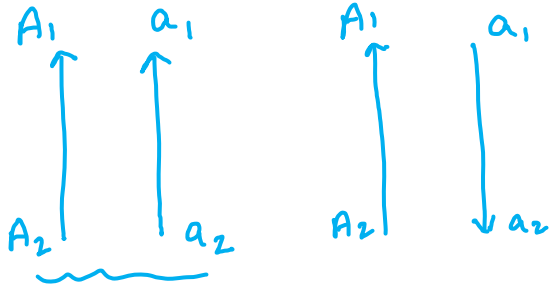
$Y_g y_g 2$

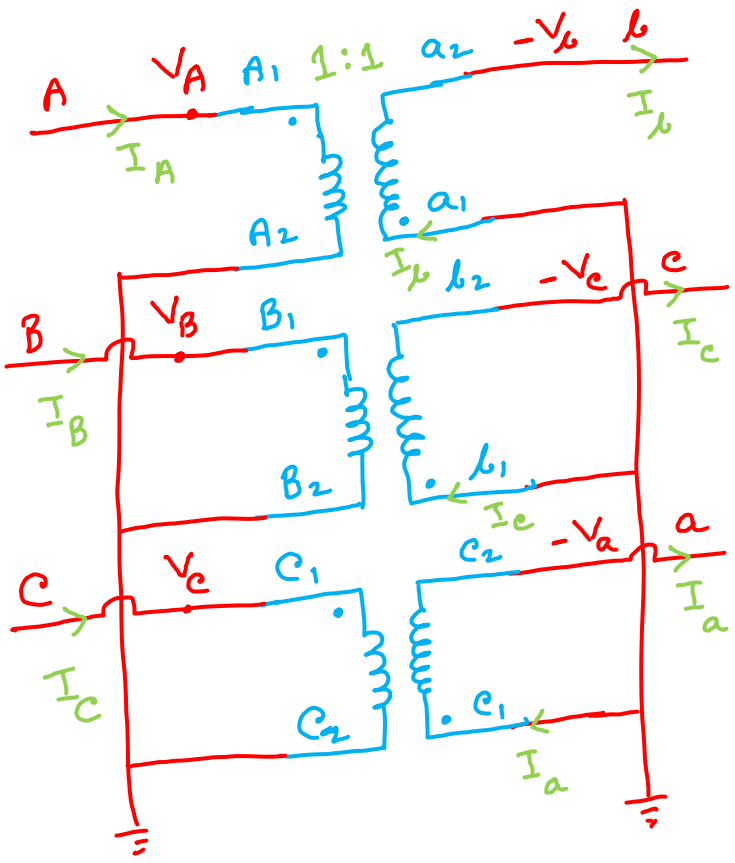
$2 \times 30^\circ = 60^\circ$











$$I_A = y[V_A - (-V_b)] = y(V_A + V_b)$$

$$I_B = y(V_B + V_c)$$

$$I_C = y(V_C + V_a)$$

$$I_A = -I_b \Rightarrow I_b = -I_A = -y(V_A + V_b)$$

$$I_B = -I_c \Rightarrow I_c = -I_B = -y(V_B + V_c)$$

$$I_C = -I_a \Rightarrow I_a = -I_C$$

$$\Rightarrow I_a = -y(V_C + V_a)$$

$$I_p^{abc} = [I_A \quad I_B \quad I_C]^T \; ; \; I_s^{abc} = [-I_a \quad -I_b \quad -I_c]^T$$

$$V_p^{abc} = [V_A \quad V_B \quad V_C]^T \; ; \; V_s^{abc} = [V_a \quad V_b \quad V_c]^T$$

$$\begin{bmatrix} I_p^{abc} \\ I_s^{abc} \end{bmatrix} = \begin{bmatrix} Y_I & Y_{II} \\ Y_{III} & Y_{IV} \end{bmatrix} \begin{bmatrix} V_p^{abc} \\ V_s^{abc} \end{bmatrix}$$

$$I_p^{abc} = \begin{bmatrix} I_A \\ I_B \\ I_C \end{bmatrix}, \quad I_s^{abc} = \begin{bmatrix} -I_a \\ -I_b \\ -I_c \end{bmatrix}$$

$$Y_I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}, \quad Y_{II} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$$

$$Y_{III} = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}, \quad Y_{IV} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$V_p^{abc} = \begin{bmatrix} V_A \\ V_B \\ V_C \end{bmatrix}, \quad V_s^{abc} = \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix}$$

$Y_I = I_3$ → (3×3) identity matrix

$Y_{IV} \rightarrow I_3$

$$Y_{II} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix} ; \quad Y_{III} = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

$$Y_{II} = Y_{III}^{T}$$