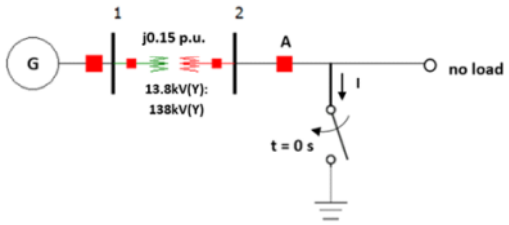
Q2

Wednesday, March 27, 2024 9:58 PM

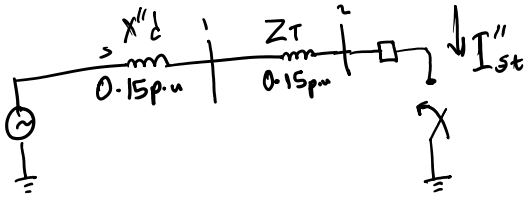


$S_{Base} = \frac{100 MVA}{3} = 33.33 MVA$

$V_{Base} = 13.8 kV$

$Z_{Base} = \frac{(13.8 kV)^2}{33.33 MVA} = 5.713 \Omega$

$I_{Base} = \frac{13.8 kV}{Z_{Base}} = 2.415 kA$



2a $I''_{st} = \frac{V_m}{X''_d + Z_T} = \frac{\sqrt{2}(1.0)}{0.15 + 0.15}$ p.u

$I''_{st} = 4.714$ p.u

$I''_{st}[A] = I'_{st} \times I_{Base} = 4.714 \times 2.415 [kA]$

$= 11.387 [kA]$

$I_{DC} = \frac{V_m}{X''_d} e^{-t/T_A} = \frac{\sqrt{2}(1.0)}{0.15} e^{-t/0.15}$

@ 3 cycles $t = \frac{1}{3xf} = \frac{1}{3 \times 60 Hz} = 5.56$ m sec

$I_{DC} = 9.0853$ p.u

$$I_{DC}[A] = I_{DC} \times I_{base} = 9.0853 \times 2.415[kA]$$

$$I_{DC}[A] = 21.945[kA]$$