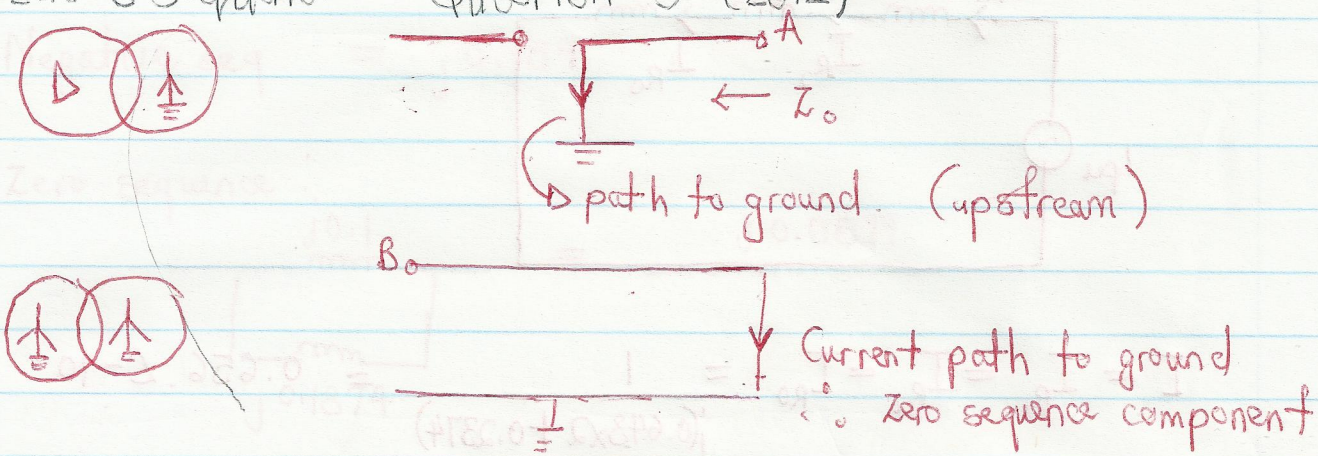
Zero Sequence – Question 5 (2012)



Positive Sequence Impedance:

$j0.2 \quad j0.15 \quad jX \quad \frac{50}{20} \times 0.1$

Overhead line: $Z_{base} = \frac{V_{base}^2}{VA_{base}} = \frac{(182 \times 10^3)^2}{50 \times 10^6} = 348.48\ \Omega$

$x\ (pu) = \frac{15}{348.48} = 0.043\ pu.$

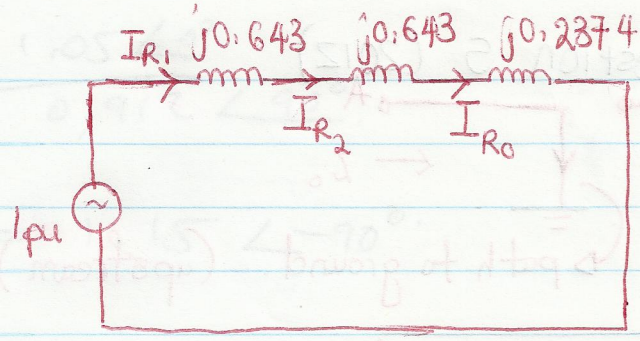
$= \frac{}{0.2+0.15+0.043+0.25} = j0.643\ pu$

Negative Seq Impedance.

$j0.643\ pu$

Zero sequence:

$j0.10 \quad j0.0574 \quad j0.08 = j0.2374$

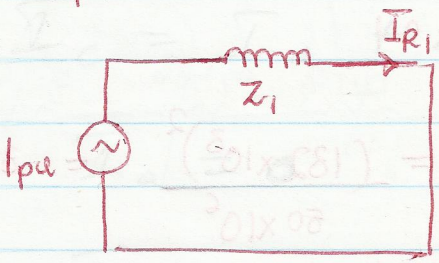


$$I = I_{R_1} = I_{R_2} = I_{R_0} = \frac{1}{j(0.643 \times 2 + 0.2374)} = 0.656 \angle -90$$

$$I_R = I_{R_1} + I_{R_2} + I_{R_0} = 1.968$$

$I_W = 0$, $I_B = 0$

Three phase :



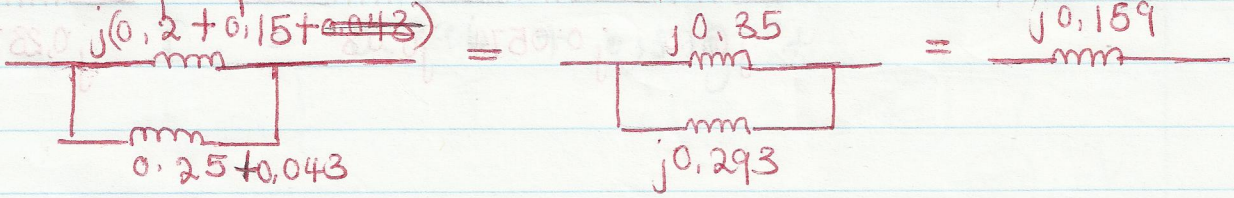
$$I_{R_1} = \frac{1}{0.643} = 1.555$$

$$I_R = a^0 I_{R_1} = 1.555$$
$$I_W = a^2 I_{R_1} = 1.555 \angle 240$$
$$I_B = a I_{R_1} = 1.555 \angle 120.$$

$$\frac{|I_{R_0}|}{|I_{R(3\phi)}|} = \frac{1.968}{1.55} \Rightarrow \text{all the three } \frac{I_W}{I_{W(3\phi)}} = 0 = \frac{I_B}{I_{B(3\phi)}}$$

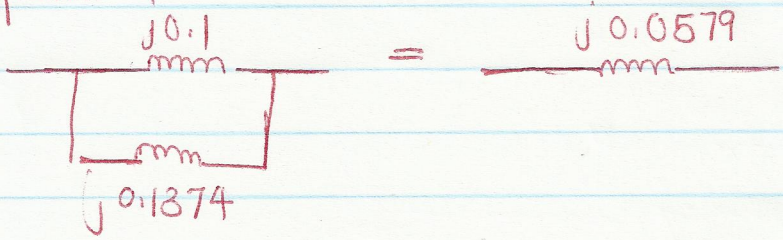
On the secondary side.

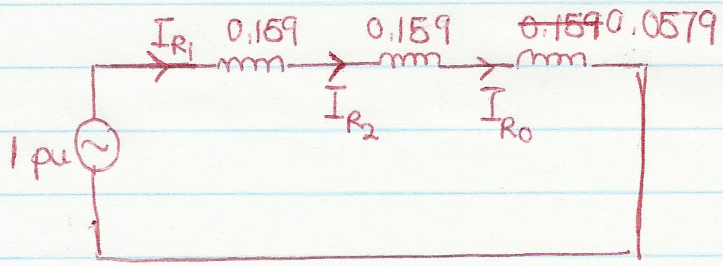
Positive seq Impedance



Negative seq = j0.159

Zero sequence:





$$I_{R_1} = I_{R_2} = I_{R_0} = \frac{1}{0.\ldots.} = 2.66$$

The rest is the same as before.

Generator:

Z_0 Changes to j0.80.