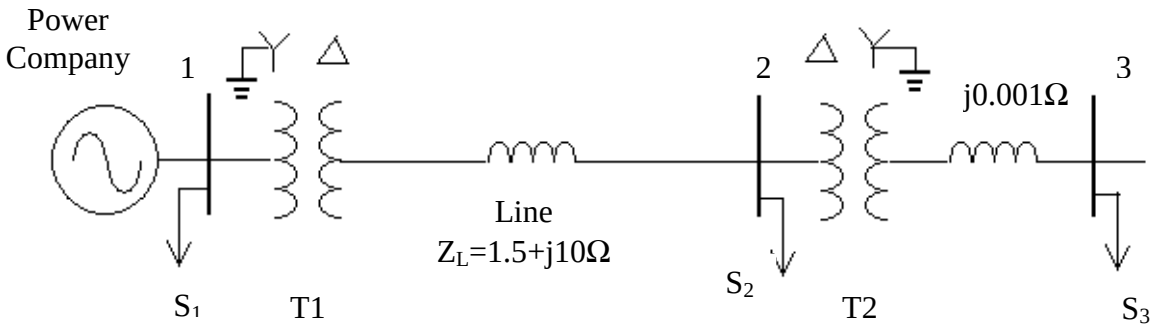
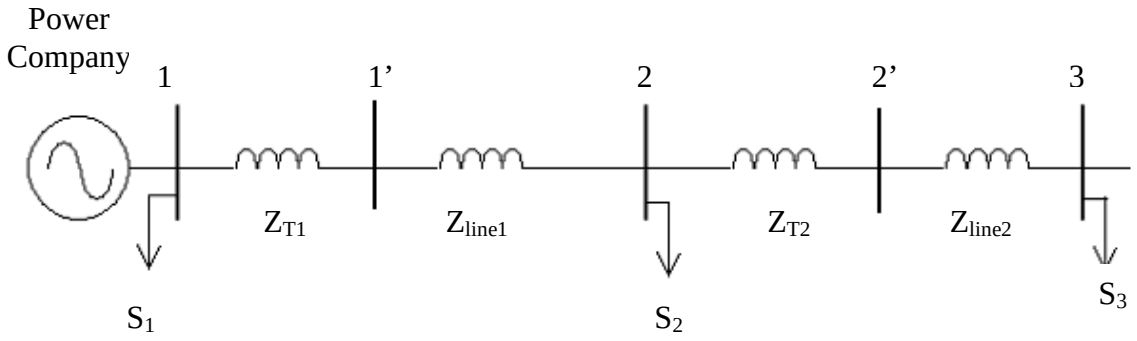
EE341 Project Solution Part I: Matlab



V_{b1}=480 V V_{b2}=13,800 V V_{b3}=480 V

S_b=1000 kVA

Compute the per-unit equivalent circuit:

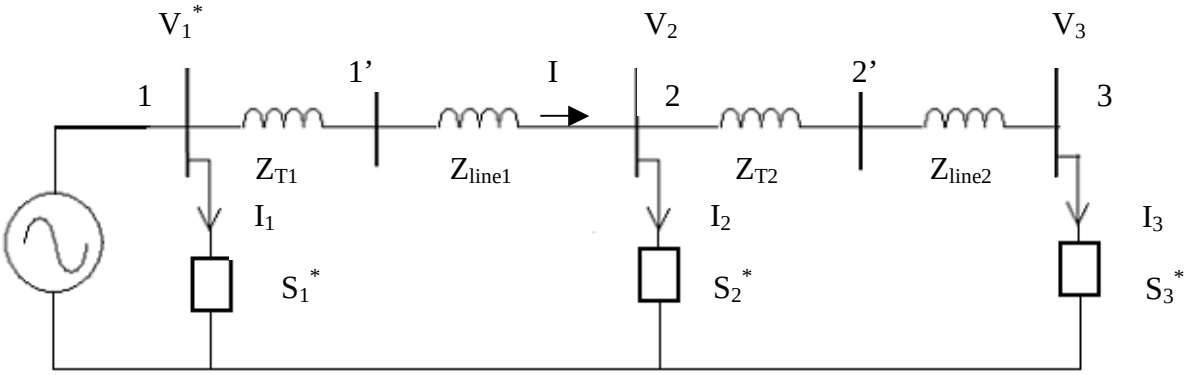


$$Z_{b2} = \frac{\left(V_{b2}/\sqrt{3}\right)^2}{S_b/3} = \frac{V_{b2}^2}{S_b} \qquad Z_{line1,pu} = \frac{Z_{line1}}{Z_{b2}}$$

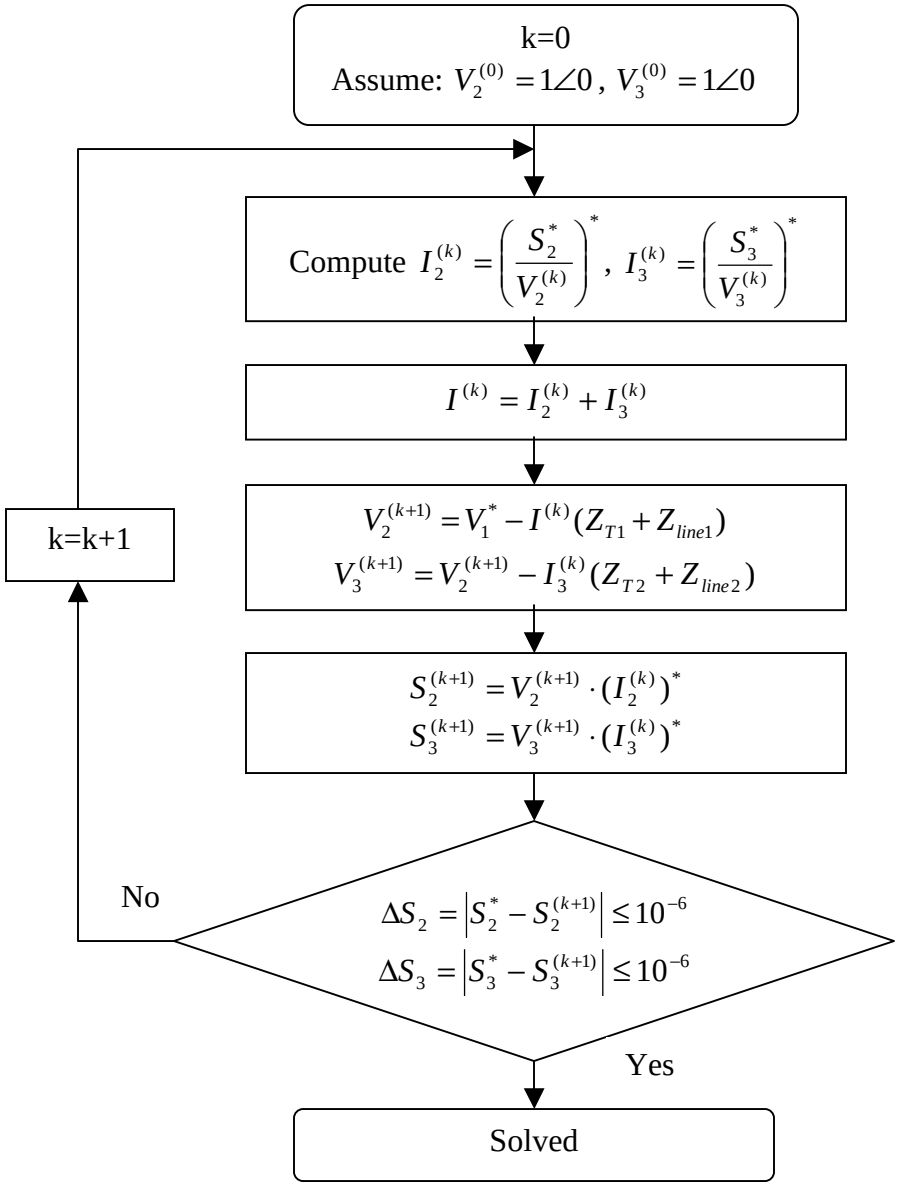
$$Z_{b3} = \frac{V_{b3}^2}{S_b} \qquad Z_{line2,pu} = \frac{Z_{line2}}{Z_{b3}}$$

$$Z_{T2,new} = Z_{T2,old}\left(\frac{V_{b,old}}{V_{b,new}}\right)^2 \frac{S_{b,new}}{S_{b,old}} = (.02 + j.085)\left(\frac{13800}{13800}\right)^2 \frac{1000}{500} = .04 + j.17$$

Problem (a): Compute V_2 and V_3



Given: S_1^*, S_2^*, S_3^*, Z_{T1}, Z_{T2}, Z_{line1}, Z_{line2}, $V_1^* = (460/480)\angle 0^o$



Problem (b): Add reactive power (Q_{c2} and Q_{c3}) to bus 2 and 3 to adjust V_2 and V_3