系统接线如题 8-10 图所示，已知各元件参数如下。发电机 G：$S_N = 300$ MV·A，$x''_d = x_{(2)} = 0.22$，变压器 T-1：$S_N = 360$ MV·A，$U_S = 12\%$，变压器 T-2：$S_N = 360$ MV·A，$U_S = 12\%$，线路 L：每回路 $l = 120$ km，$x_{(1)} = 0.4$ Ω/km，$x_{(0)} = 3x_{(1)}$；负荷：S_{LD}

题 8-10 图

$= 300$ MV·A。当 f 点发生单相短路时，试计算各序组合电抗并作出复合序网。

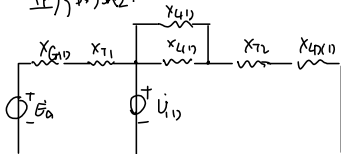选 $S_B = 300$ MVA、$U_B = U_{av}$。

$$X_{G(1)} = X_{G(2)} = 0.22$$

$$X_{T1} = \frac{U_{ST1}\%}{100} \cdot \frac{S_B}{S_{T1N}} = \frac{12}{100} \times \frac{300}{360} = 0.1, \quad X_{T2} = \frac{U_{ST2}\%}{100} \cdot \frac{S_B}{S_{T2N}} = \frac{12}{100} \times \frac{300}{360} = 0.1$$

$$X_{L(1)} = X_{L(2)} = x_{(1)} l \frac{S_B}{U_{av}^2} = 0.4 \times 120 \frac{300}{230^2} = 0.272$$

$$X_{L(0)} = 3 X_{L(1)} = 3 \times 0.272 = 0.816$$

$$X_{LD(1)} = X_{LD(1)} \frac{S_B}{S_{LD}} = 1.2 \times \frac{300}{300} = 1.2, \quad X_{LD(2)} = X_{LD(2)} \frac{S_B}{S_{LD}} = 0.35 \times \frac{300}{300} = 0.35$$

正序网络：

$$X_{(1)} = (X_{T1} + X_{G(1)}) \parallel \left(\frac{1}{2} X_{L(1)} + X_{T2} + X_{LD(1)}\right)$$

$$= \frac{(0.1 + 0.22) \times (\frac{1}{2} \times 0.272 + 0.1 + 1.2)}{(0.1 + 0.22) + (\frac{1}{2} \times 0.272 + 0.1 + 1.2)} = 0.261$$
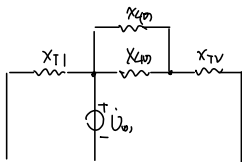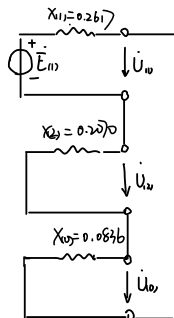
负序网络：

$$X_{(2)} = (X_{T1} + X_{G(2)}) \parallel \left(\frac{1}{2} X_{L(2)} + X_{T2} + X_{LD(2)}\right)$$

$$= \frac{(0.1 + 0.22) \times (\frac{1}{2} \times 0.272 + 0.1 + 0.35)}{(0.1 + 0.22) + (\frac{1}{2} \times 0.272 + 0.1 + 0.35)} = 0.2070$$

零序网络

$$X_{(0)} = X_{T1} \parallel \left(\frac{1}{2} X_{L(0)} + X_{T2}\right)$$

$$= \frac{0.1 \times (\frac{1}{2} \times 0.816 + 0.1)}{0.1 + (\frac{1}{2} \times 0.816 + 0.1)} = 0.0836$$

单相短路.三序网络在
短路处串联.
复合序网如右所示

$X_{(1)}=0.261$

$\dot{E}_{(1)}$ $\downarrow \dot{U}_{(1)}$

$X_{(2)}=0.261$ $\downarrow \dot{U}_{(2)}$

$X_{(0)}=0.0836$ $\downarrow \dot{U}_{(0)}$

8-11 系统接线如题 8-11 图所示,各元件参数标幺值如下

发电机 G-1 $x_{(1)}=x_{(2)}=0.12, E=1.05\angle 0°$;
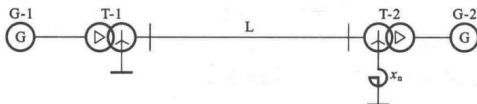
       G-2 $x_{(1)}=x_{(2)}=0.14, E=1.05\angle 0°$;
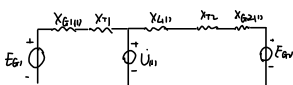
变压器 T-1 $x=0.1$

       T-2 $x=0.12, x_n=0.2$;

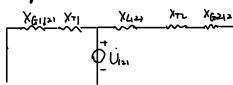线路 L $x_{(1)}=x_{(2)}=0.5, x_{(0)}=1.2$。
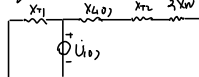
线路首端发生单相短路,试计算短路电流。

题 8-11 图

正序网络:

$X_{G1(1)}$ X_{T1} $X_{L(1)}$ X_{T2} $X_{G2(1)}$

E_{G1} $\downarrow \dot{U}_{(1)}$ $\dot{E}_{G2}$

负序网络:

$X_{G1(2)}$ X_{T1} $X_{L(2)}$ X_{T2} $X_{G2(2)}$

$\downarrow \dot{U}_{(2)}$

由于 $X_{G1(1)}=X_{G1(2)}$. $X_{G2(1)}=X_{G2(2)}$. $X_{L(1)}=X_{L(2)}$. 则

$$X_{(1)}=X_{(2)}=\frac{(X_{G1(1)}+X_{T1})(X_{L(1)}+X_{T2}+X_{G2(1)})}{(X_{G1(1)}+X_{T1})+(X_{L(1)}+X_{T2}+X_{G2(1)})}=\frac{(0.12+0.1)\times(0.5+0.12+0.14)}{(0.12+0.1)+(0.5+0.12+0.14)}=0.1706$$

零序网络:

X_{T1} $X_{L(0)}$ X_{T2} $3X_n$

$\dot{U}_{(0)}$

$$X_{(0)}=\frac{X_{T1}(X_{L(0)}+3X_n+X_{T2})}{X_{T1}+(X_{L(0)}+3X_n+X_{T2})}=\frac{0.1\times(1.2+3\times0.2+0.12)}{0.1+(1.2+3\times0.2+0.12)}=0.0950$$

由正序等效定则得

$$I_f^{(1)}=m^{(1)}I_{(1)}^{(1)}=\frac{3E}{X_{(1)}+X_{(2)}+X_{(0)}}=\frac{3\times1.05}{0.1706+0.1706+0.0950}=7.2214$$