

继电保护作业 1

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第一题

$$(1) I_{k,2,max} = \frac{E}{X_{s,min} + X_{L2}} = 2495A$$

$$\text{取 } K_{rel} = 1.2 \quad I_{act,2}^I = K_{rel} I_{k,2,max} = 2994A$$

$$(2) \text{取 } K_{rel}^I = 1.2 \quad K_{rel}^{II} = 1.2$$

$$I_{K,1,max} = \frac{E}{X_{s,min} + X_{L1} + X_{L2}} = 1027A$$

$$I_{act,2}^{II} = K_{rel}^{II} K_{rel}^I I_{K,1,max} = 1478.9A$$

$$\text{而 } I_{k,2,min} = \frac{\sqrt{3}E}{2(X_{s,max} + X_{L2})} = 2017A$$

$$\text{则 } K_{sen} = \frac{I_{K,2,min}}{I_{act,2}^{II}} = 1.36$$

$$t_2^{II} = t_1^I + \Delta t = 0.5s$$

$$(3) \text{取 } K_{rel}^{III} = 1.15 \quad K_{re} = 0.85$$

$$I_{act,2}^{III} = \frac{K_{rel}^{III} \cdot K_{ss}}{K_{re}} \cdot I_{L,max} = 365.3A$$

$$K_{sen} = \frac{I_{k,2,min}}{I_{act,2}^{III}} = 5.52$$

$$t_2^{III} = 2.6 + 0.5 = 3.1s$$

应该采用三相星形接线

第二题

$$(1) I_{L,2,max} = \frac{E}{X_{s,min} + X_{L2}} = 1455A$$

$$\text{取 } K_{rel} = 1.2 \quad I_{act,2}^I = K_{rel} \cdot I_{L,2,max} = 1746A$$

$$(2) I_{L,1,max} = \frac{E}{X_{s,min} + X_{L2} + X_{L1}} = 1027A$$

$$\text{而 } I_{L,2,min} = \frac{\sqrt{3}E}{2(X_{s,max} + X_{L2})} = 1210A$$

$$I_{L,2,min} > 1.3 \times 1.2 I_{L,1,max}$$

所以要与 1 线路的 II 段保护配合即

$$I_{act,2}^{II} = 1.2 I_{act,1}^{II} = 900A$$

$$K_{sen} = \frac{I_{L,2,min}}{I_{act,1}^{III}} = 1.34$$

$$t_2^{II} = t_1^{II} + \Delta t = 1.1s$$

(3) 取 $K_{rel}^{III} = 1.15$ $K_{re} = 0.85$

$$\text{则 } I_{act,2}^{III} = \frac{K_{ss} \cdot K_{rel}^{III}}{K_{re}} \cdot I_{L,max} = 365.3A$$

$$t_2^{III} = t_3^{III} + \Delta t = 3.1s$$

应该采用三相三接线法

第三题

设保护范围为 1

$$\text{有 } \frac{\sqrt{3}E}{2X_{s,max} + l \cdot X_{L2}} = I_{act,2}^I$$

$$\gg l = 0.51 \quad \text{即保护范围是 } 51\%$$

第四题

$$(1) I_{L,2,max} = \frac{E}{X_{s,min} + X_{L2}} = 1852A$$

取 $K_{rel}^I = 1.2$

$$I_{act,2}^I = K_{rel}^I \cdot I_{L,2,max} = 2222A$$

$$(2) I_{L,1,max} = \frac{E}{X_{s,min} + X_{L2} + X_{X_{L1}}} = 741A$$

$$\gg I_{act,2}^{II} = K_{rel}^{II} \cdot K_{rel}^I \cdot I_{L,1,max} = 1067A$$

$$I_{L,2,min} = \frac{\sqrt{3}E}{2(X_{s,max} + X_{X_{L2}})} = 1481A$$

$$\gg K_{sen} = \frac{I_{L,2,min}}{I_{act,2}^{III}} = 1.39$$

$$t_2^{II} = t_1^{II} + \Delta t = 0.5s$$

$$(3) I_{L,max} = \frac{P_{max}}{\sqrt{3}U_m \cos \varphi} = 173.64A$$

取 $K_{rel}^{III} = 1.15$ $K_{re} = 0.85$

$$I_{act,2}^{III} = \frac{K_{rel} \cdot K_{ss}}{K_{re}} \cdot I_{L,max} = 375.88A$$

$$\gg K_{sen} = \frac{I_{L,2,min}}{I_{act,2}^{III}} = 3.94$$

$$t_2^{III} = t_1^{III} + \Delta t = 2.1s$$

应该采用两相三接线法