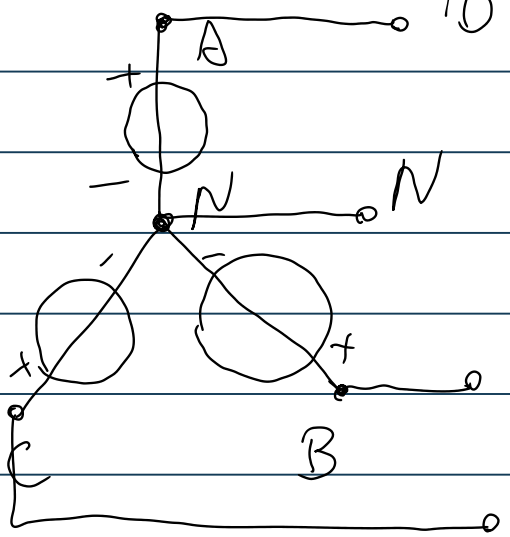
三相电路的电压和电流关系推导

Tuesday, September 19, 2023 10:10 AM



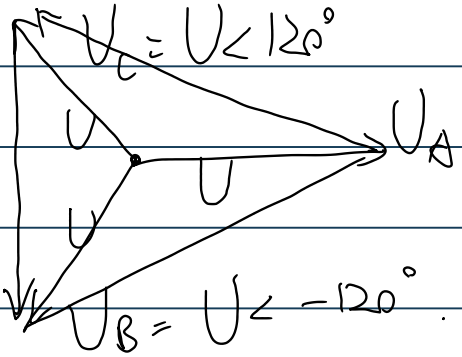
①：对于星形连接的三相电路，

由：$U_A = U\angle 0°$

$U_B = U\angle -120°$

$U_C = U\angle 120°$，

有：$U_{AB} = U_A - U_B = U\angle 0° - U\angle -120°$



$= U - (-\frac{1}{2}U - \frac{\sqrt{3}}{2}jU)$

$= \frac{3}{2}U + \frac{\sqrt{3}}{2}jU = \sqrt{\frac{9}{4}+\frac{3}{4}} = \sqrt{3}U\angle 30°$，

$\tan\theta = \frac{y}{x} = \frac{\sqrt{3}}{3}$

而：$U_{BC} = U_B - U_C = \sqrt{3}U\angle -90°$.

$U_{CA} = U_C - U_A = \sqrt{3}U\angle 150°$，

我们得：

$U_{AB} = \sqrt{3}U\angle 30°$，$U_{BC} = \sqrt{3}U\angle -90°$，$U_{CA} = \sqrt{3}U\angle 150°$.

由 $U_A = U\angle 0°$ $U_B = U\angle -120°$ $U_C = U\angle 120°$

从而易知：

$U_{AB} = \sqrt{3}U_A\angle 30°$，$U_{BC} = \sqrt{3}U_B\angle 30°$，$U_{AC} = \sqrt{3}U_C\angle 30°$

故有如下绘图：

故有如下[illegible]图：