三系学习生活部

例8-1：已知 $u=311.1\cos(314t-\frac{\pi}{3})V$

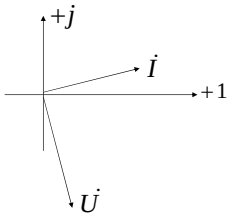
$i=141.4\cos(314t+\frac{\pi}{6})A$

写出表示u, i的相量，并做相量图。

解：

$\dot{U}=\frac{311.1}{\sqrt{2}}\angle-\frac{\pi}{3}=220\angle-\frac{\pi}{3}V$

$\dot{I}=\frac{141.4}{\sqrt{2}}\angle\frac{\pi}{6}=100\angle\frac{\pi}{6}A$



1

例8-2：已知 $\dot{U}=50\angle-30°V$ f=50 Hz

写出u的瞬时值表达式

解

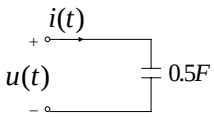
$u=\sqrt{2}50\cos(2\pi\times50t-30^0)$

$=70.7\cos(314t-30^o)V$

2

例8-3 已知 $i(t)=\sqrt{2}\cos(100t-30^o)A$

求 $u(t)$



解：1. 由已知正弦量写出对应的相量

$\dot{I}=1\angle-30°A$

2. 由电路方程的相量形式求出响应的相量

$\dot{U}=-j\frac{1}{\omega C}\dot{I}=-j\frac{1}{100\times0.5}1\angle-30°=0.02\angle-120°V$

3. 写出响应的正弦量

$u(t)=0.02\sqrt{2}\cos(100t-120^\circ)v$

3

例8-4

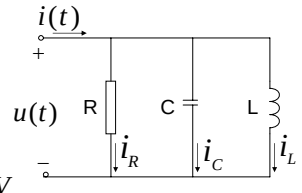
已知 $R=15\Omega$

$L=30mH$

$C=83.3\mu f$

$u(t)=120\sqrt{2}\sin(1000t+90^o)V$

求 $i(t)$



解： $\dot{U}=120\angle90^\circ V$

$\dot{I}=\dot{I}_R+\dot{I}_L+\dot{I}_C$

4

$\dot{I}=\dot{I}_R+\dot{I}_L+\dot{I}_C$

$=\frac{\dot{U}}{R}+\frac{\dot{U}}{j\omega L}+j\omega C\dot{U}$

$=8\angle90^\circ+4\angle0^\circ+10\angle180^\circ$

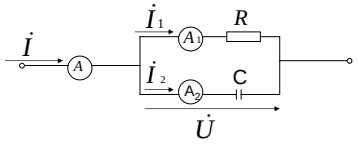
$=j8+4-10$

$=10\angle127^\circ A$

$i(t)=10\sqrt{2}\sin(1000t+127^\circ)A$

5

例8-5



已知：三个电流表的读数均为有效值，A_1、A_2的读数均为10A

求：A的读数

解：法1 解析法

设 $\dot{U}=U\angle0^\circ$

$\dot{I}=\dot{I}_1+\dot{I}_2$

$=10\angle0^\circ+10\angle90^\circ$

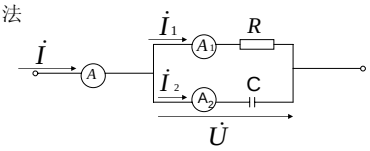
$=10+j10$

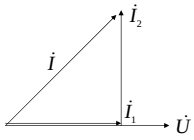
$=10\sqrt{2}\angle45^\circ A$

$I=10\sqrt{2}A$

6

法2. 相量图法





$$I=\sqrt{I_1^2+I_2^2}=\sqrt{10^2+10^2}=10\sqrt{2}\,A$$

7