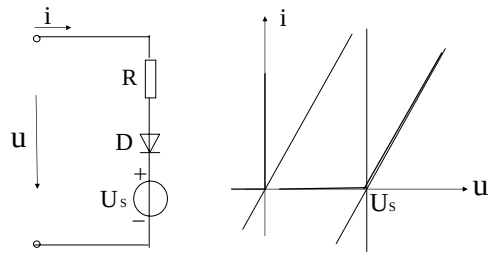
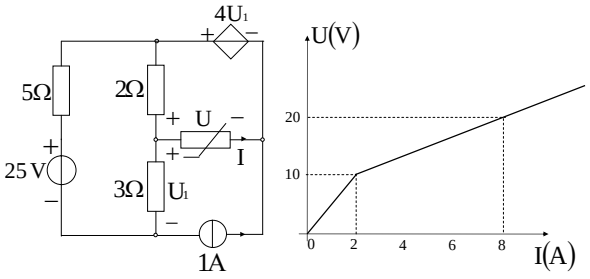
例17-1：

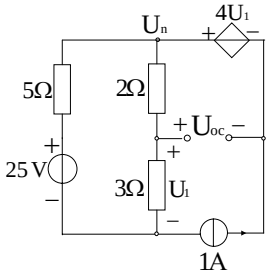


例17-2: 求U, I



2

解：



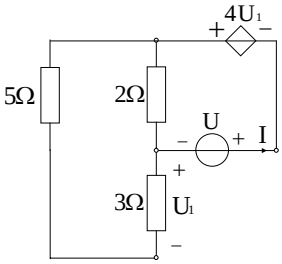
$$\left(\frac{1}{5}+\frac{1}{5}\right)U_n=\frac{25}{5}+1$$

$$U_n=15\text{V}$$

$$U_1=\frac{15}{5}\times 3=9\text{V}$$

$$U_{oc}=4\times 9-\frac{15}{5}\times 2=30\text{V}$$

3



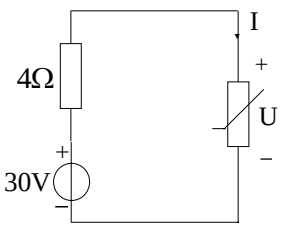
$$U_1=-\frac{4U_1+U}{5+3}\times 3$$

$$U_1=-\frac{3}{20}U$$

$$\frac{4U_1+U}{2}=I+\frac{U_1}{3}$$

$$R_{eq}=\frac{U}{I}=4\Omega$$

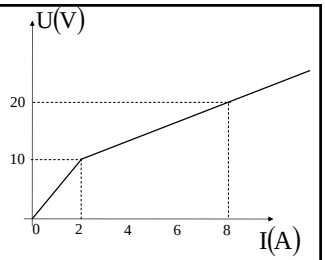
4



$$U=30-4I$$

5

非线性电阻特性



$$\begin{cases} U=5I & 0<I<2\text{A} \\ U=\dfrac{5}{3}I+\dfrac{20}{3} & I>2\text{A} \end{cases}$$

6

设 $I<2A$

$$\begin{cases} U=30-4I \\ U=5I \end{cases}$$

$$I=\frac{10}{3}>2$$

∴假设错误

7

设 $I>2A$

$$\begin{cases} U=30-4I \\ U=\frac{5}{3}I+\frac{20}{3} \end{cases}$$

$I=4.1A$

$U=13.6V$

$\therefore I>2A$

∴假设正确

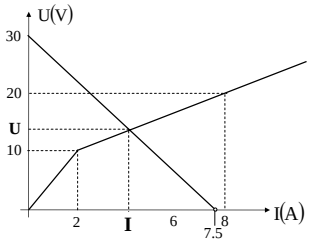
8

另法：

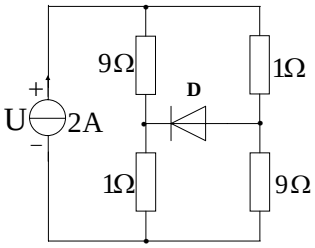
$U=30-4I$

I=0 U=30V

U=0 I=7.5A

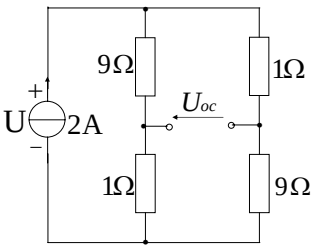


例17-3：D为理想二极管，求U



10

解：

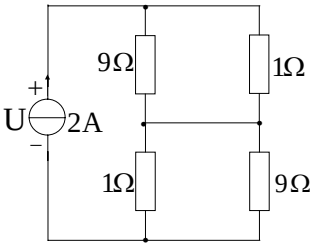


$U_{oc}=9-1=8V$

$\because U_{oc}>0$

$\therefore$ D导通

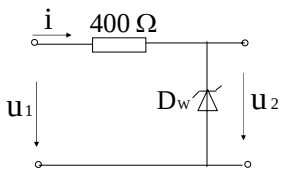
11

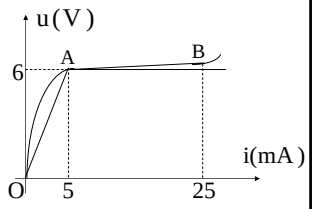


$$U=2\times2\frac{1\times9}{1+9}=3.6V$$

12

例17-4：



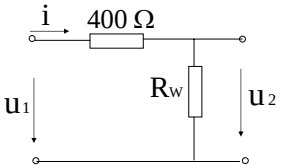


工作点在A点 $i=\dfrac{u_1-6}{400}=5\text{mA}$ $u_1=8\text{V}$

工作点在B点 $i=\dfrac{u_1-6}{400}=25\text{ mA}$ $u_1=16\text{ V}$

13

当 $0\le u_1\le 8\text{V}$



$R_W=\dfrac{6}{5\times10^{-3}}=1.2\text{k}\Omega$

$i=\dfrac{u_1}{400+1200}=\dfrac{u_1}{1600}A$

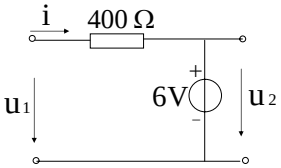
$u_2=\dfrac{1200}{400+1200}u_1=0.75u_1$

14

当 $8\text{V}\le u_1\le 16\text{V}$

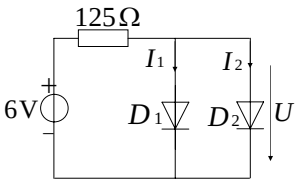
$i=\dfrac{u_1-6}{400}\text{A}$

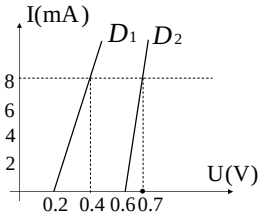
$u_2=6\text{V}$



15

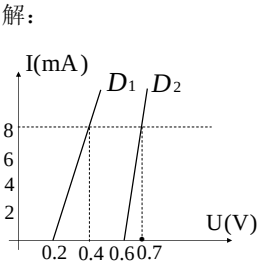
例17-5：求 I_1, I_2

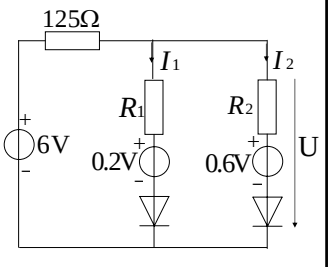




16

解：

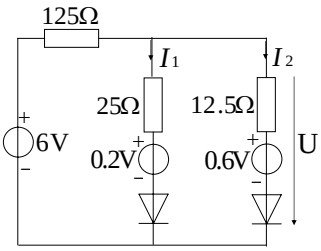




$R_1=\dfrac{0.4-0.2}{8\times10^{-3}}=25\Omega$ $R_2=\dfrac{0.7-0.6}{8\times10^{-3}}=12.5\Omega$

17

设两二极管导通



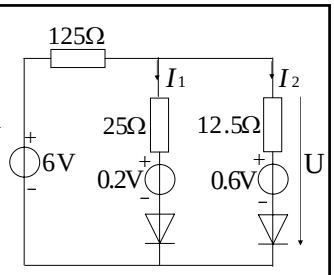
$\left(\dfrac{1}{125}+\dfrac{1}{25}+\dfrac{1}{12.5}\right)\text{U}=\dfrac{6}{125}+\dfrac{0.2}{25}+\dfrac{0.6}{12.5}$

$\text{U}=\dfrac{13}{16}\text{V}$

18

$$I_1=\frac{\frac{13}{16}-0.2}{25}=24.5\text{mA}$$

$$I_2=\frac{\frac{13}{16}-0.6}{12.5}=17\text{ mA}$$



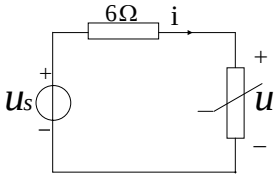
∵ $I_1>0$, $I_2>0$

∴ 假设正确

例17-6：

已知：

$$u=\begin{cases}3i^2 & i>0\\ -3i^2 & i<0\end{cases}$$



$u_S=9+10^{-3}\sqrt{2}\sin 1000\ t(V)$

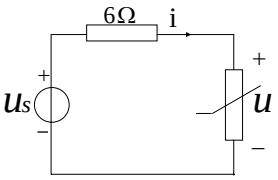
求 i(t)

20

∵交流分量<<直流分量

∴用小信号法

1. 令交流信号为零，由曲线相交法，求静态工作点



$$u=9-6i$$

$$u=\begin{cases}3i^2 & i>0\\ -3i^2 & i<0\end{cases}$$

令 $u_S=9\text{V}$

工作点 :I_o=1A,U_o=3V

21

2. 求工作点处动态电阻

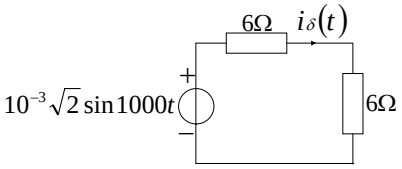
$$u=\begin{cases}3i^2 & i>0\\ -3i^2 & i<0\end{cases}$$

工作点 :I_o=1A,U_o=3V

$$R_d=\frac{du}{di}\Big|_{I_0=1A}=6i\Big|_{I_0=1A}=6\Omega$$

22

3. 作小信号等效电路，求响应的增量



$$i_\delta(t)=\frac{1}{12}\times 10^{-3}\sqrt{2}\sin 1000\ t$$

4. 求i(t)

$$i(t)=I_0+i_\delta(t)=1+\frac{1}{12}\times 10^{-3}\sqrt{2}\sin 1000\ t(A)$$