

## Homework 7

### Page 156, Chinese textbook Question 7.1

Considering a buck chopper circuit shown in the Fig. 5-8, with  $E = 200V$ ,  $R = 10\Omega$ ,  $L$  is large enough and  $E_m = 50V$ . Use the pulse width modulation method, when  $T = 40\mu s$  and  $t_{on} = 20\mu s$ , calculate the average output voltage  $U_o$  and the average output current  $I_o$ .

### Question 7.2

Considering a boost chopper circuit shown in the Fig. 5-9, with  $E = 50V$ ,  $L$  and  $C$  are large enough and  $R = 25\Omega$ . Use the pulse width modulation method, when  $T = 50\mu s$  and  $t_{on} = 20\mu s$ , calculate the average output voltage  $U_o$  and the average output current  $I_o$ .

### Answer 7.1

The load current can be considered continuous for  $L$  is large enough.  
Therefore, the average output voltage and current of a buck circuit should be:

$$U_o = DE = \frac{t_{on}}{T} E = 100(V)$$

$$I_o = \frac{U_o - E_M}{R} = 5(A)$$

### Answer 7.2

The load current can be considered continuous for  $L$  and  $C$  is large enough.  
Therefore, the average output voltage and current of a buck circuit should be:

$$U_o = \frac{1}{1-D} E = \frac{T}{T-t_{on}} E = 83.33(V)$$

$$I_o = \frac{U_o}{R} = 3.33(A)$$