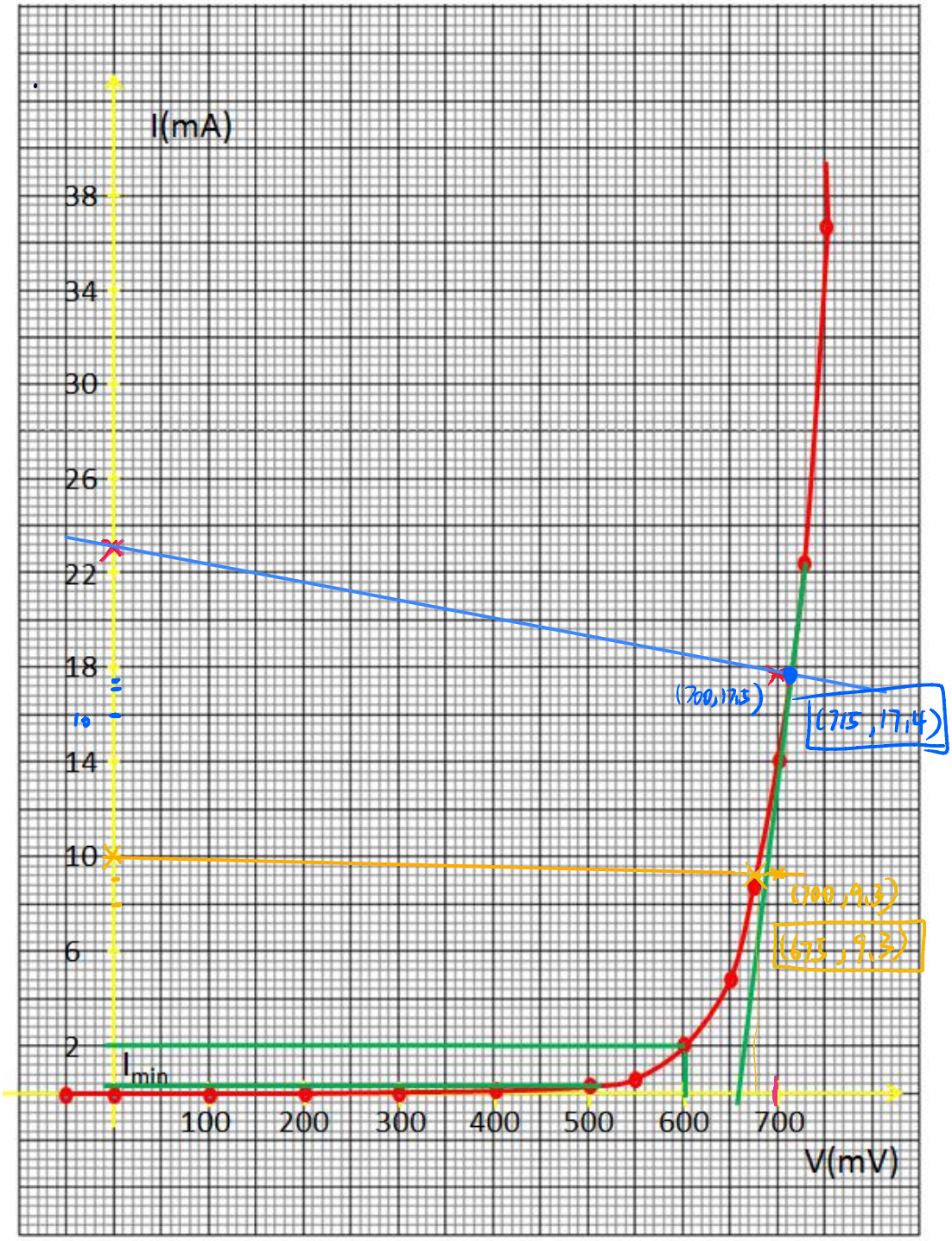
Xidan 2024-2025

TD 2 – Diodes

Caractéristique de la diode 1N4004



Question 1 : Sous Lushprojects, tracer la caractéristique de cette Diode (Retrouver ainsi le graphe ci-dessus). Déterminez les paramètres V_{seuil} et r_d.

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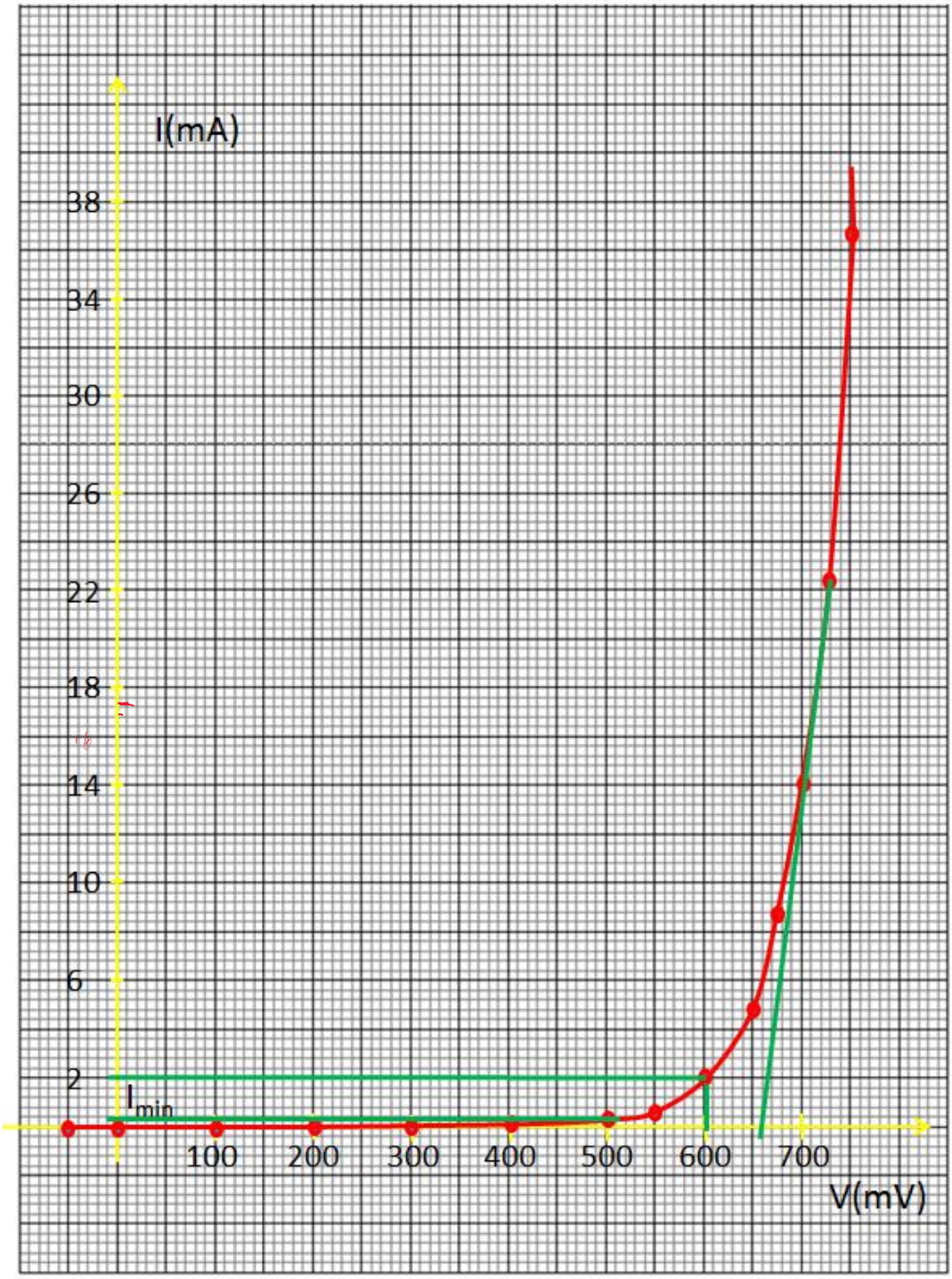
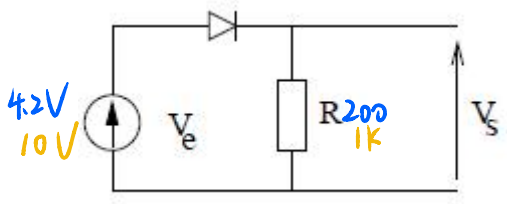


Question 1 : Sous Lushprojects, tracer la caractéristique de cette Diode (Retrouver ainsi le graphe ci-dessus). Déterminez les paramètres V_{seuil} et r_d.

Question 2 : On considère le circuit de la figure ci-dessous :



$I = \frac{Ve - U}{R}$

$I = \frac{4.2}{200} - \frac{U}{200}$ (0, 21) (700, 17.5)

$= 21mA - \frac{U}{200}$

$I = \frac{10}{1K} - \frac{1}{1K}U$ (0, 10) (700, 9.3)

$= 10mA - \frac{U}{1K}$

Dans un premier temps, on suppose que la tension d'alimentation est continue (V_e=4,2V, puis 10V). Trouver graphiquement le courant I et la tension aux bornes de la résistance pour R=200Ω puis R=1kΩ. I = 17.4mA I = 9.3mA

Calculer analytiquement ces valeurs en prenant V_{seuil} et r_d déterminés précédemment.

Idem en prenant V_{seuil}=0,6V et r_d =0.

Q2 : 2)

Dans un second temps on suppose que V_e est une tension sinusoïdale, d'amplitude maximale de E=1,8V (en supposant V_{seuil}=0,6V et r_d =0), tracer V_s en fonction du temps.

Calculer l'angle d'ouverture.

Faire ce schéma sous Lushprojects et visualiser V_e et V_s.

整流器

Question 3 : Reprendre sous Lushprojects, les différents montages à base de diode.

(1) Redresseur simple alternance (cf. question 2) 一个交流→半波

(2) Diode sans seuil

(3) Redresseur double alternance + Filtrage → 二个交流全波

(4) Modulation d'amplitude à diodes (2 puis 4 diodes)

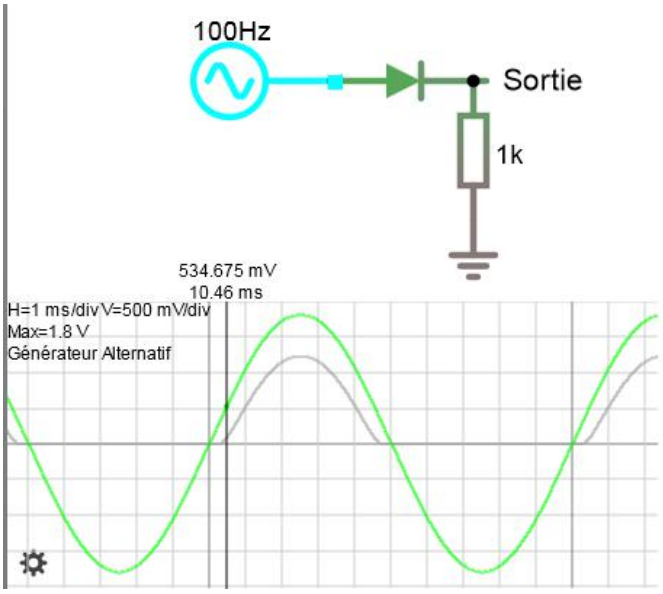
(5) Détecteur d'enveloppe – Démodulation d'amplitude (Exemple avec Paire différentielle)

(6) Calage écrêtement

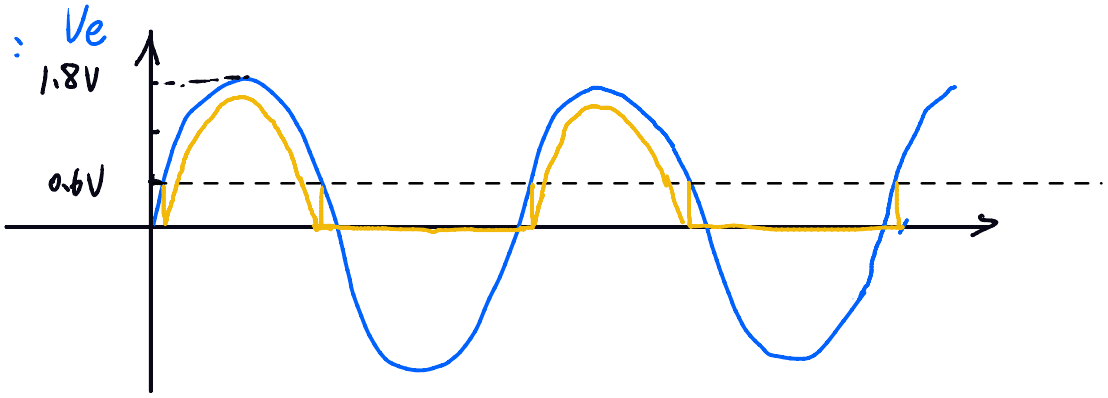
(7) LED et Zener

(8) Trigger avec Diode (cf. Cours page 44)

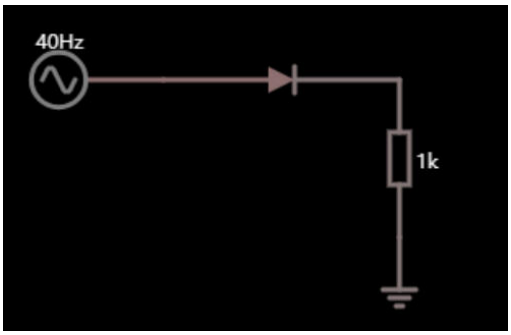
Angle d'ouverture :

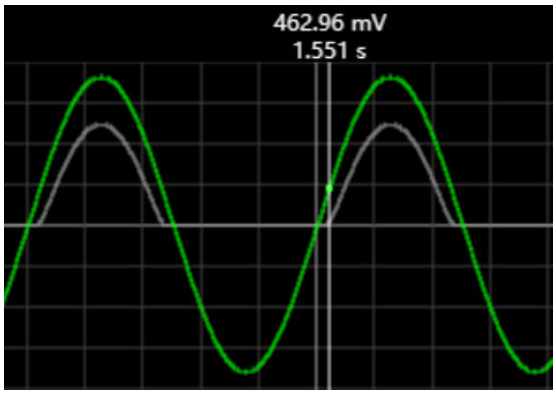


Q2 2) : Ve



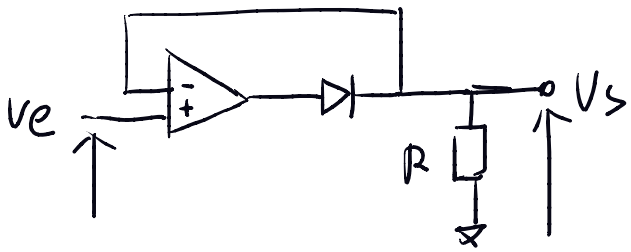
只有正向导通，且幅值减 0.6 V.

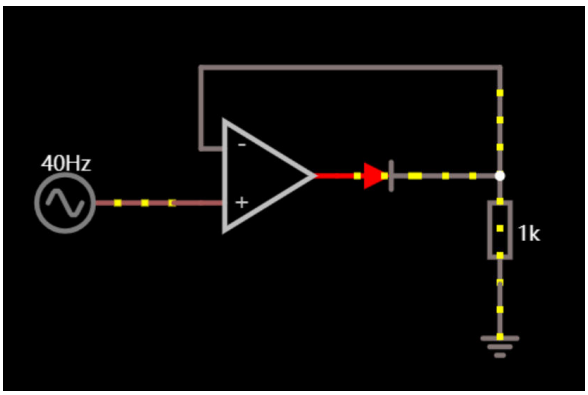


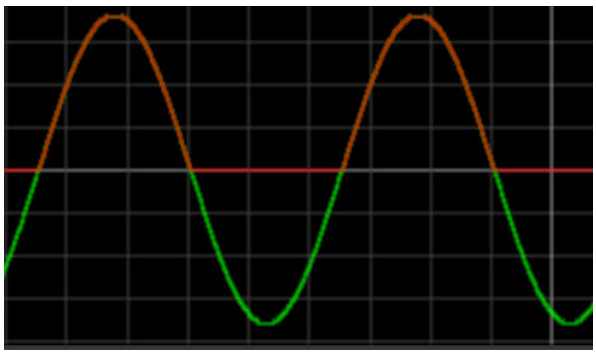


Q3 : (1)

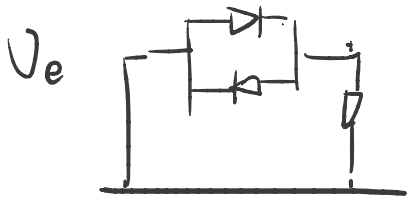
(2) Diode sans seuil 无阈值二极管

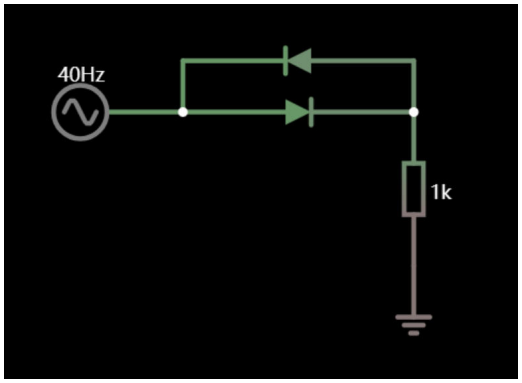


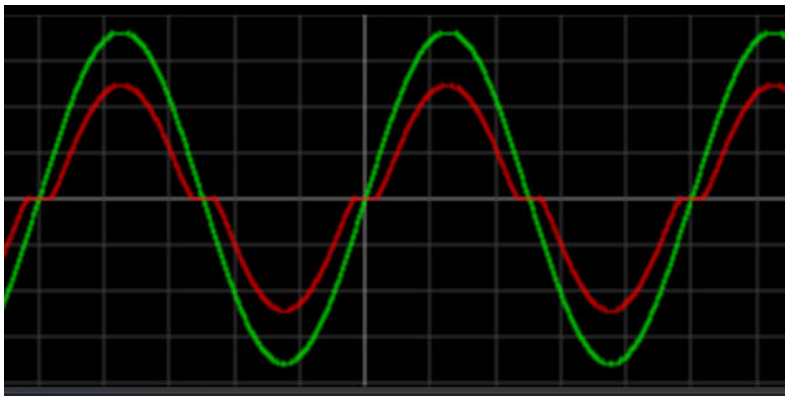




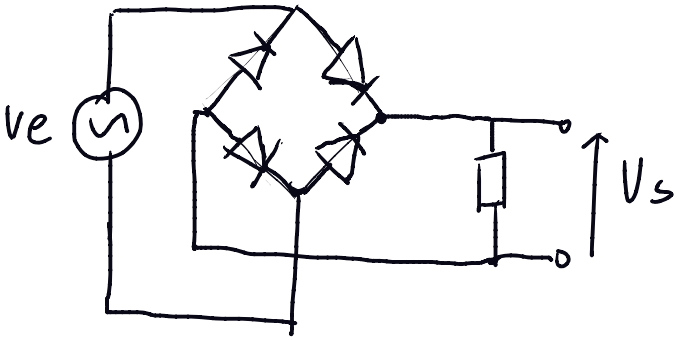
(3) 全波整流

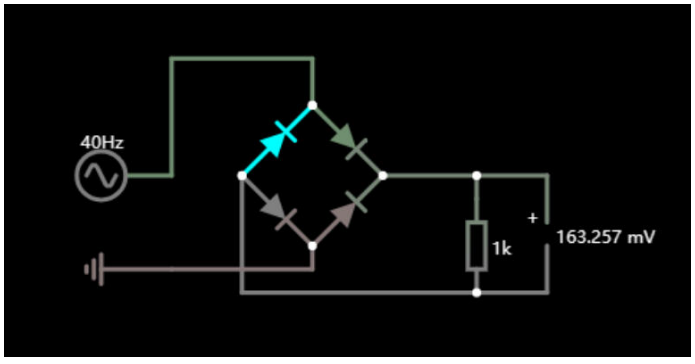


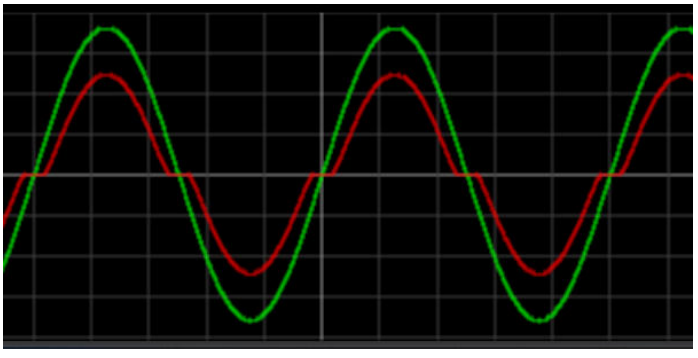




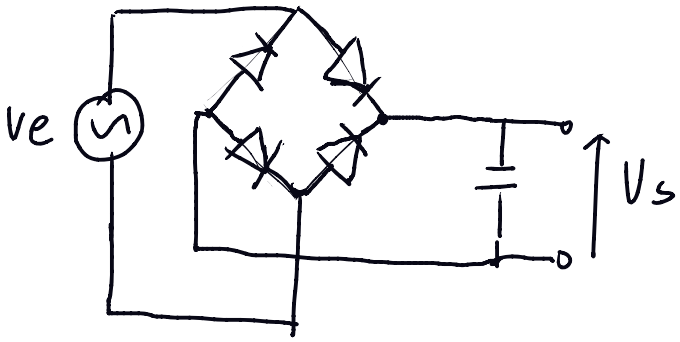
(4) 桥式整流

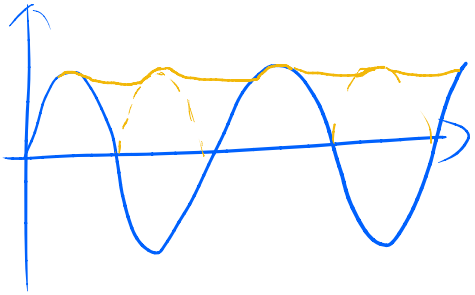


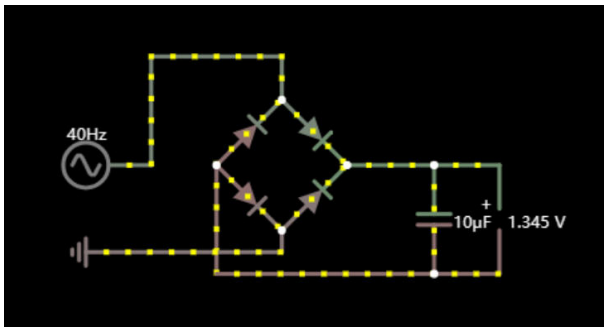


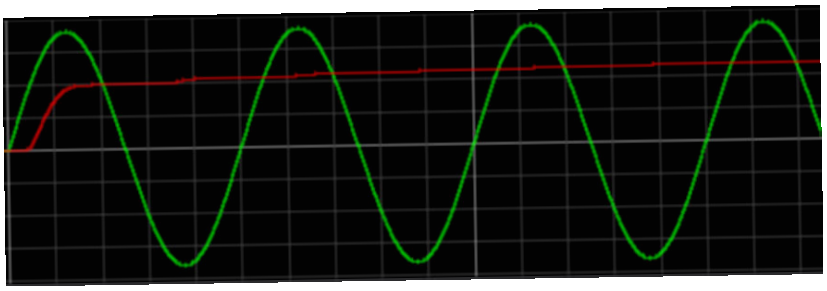


桥式交流变直流

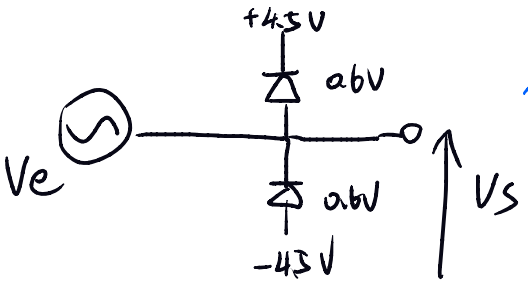








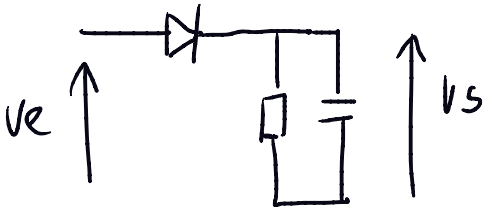
限压电路

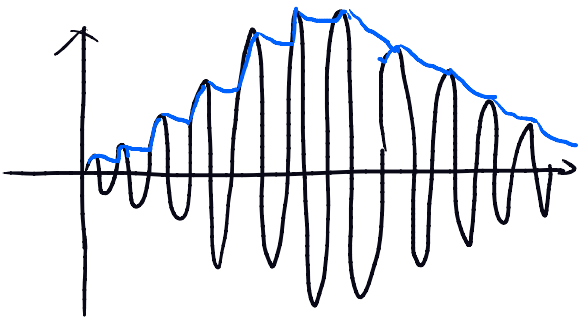


仿真画不出来

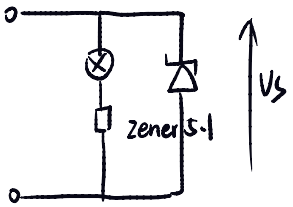
$|Vs| \leq |4.5 \pm 0.6|V$

高度检测（解调）



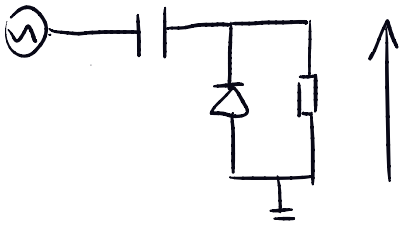


稳压电路

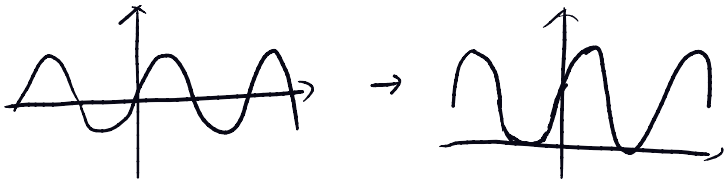


→ $V_S = 5.1V$

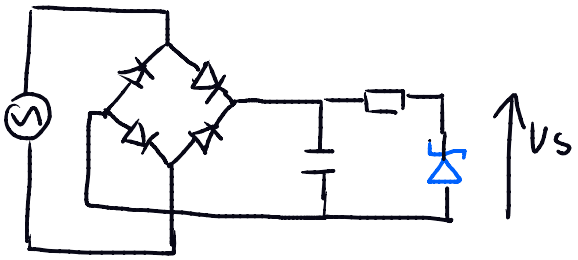
$V_e = A\sin(\omega t)$

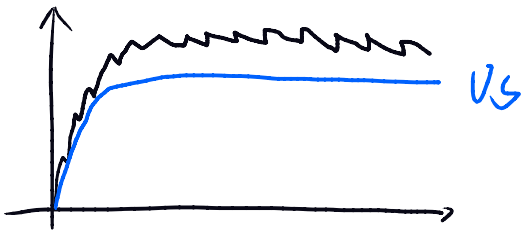


$V_S = V_e + A$



交流变稳定直流





$E = 4.2\,V$ { $R = 200\,\Omega$ { $V = 710\,mV$, $I = 17.9\,mA$; $R = 1\,k\Omega$ { $V = 640\,mV$, $I = 3.8\,mA$

$V_{seuil} \approx 0.65\,V$

$r_d \approx 2\,\Omega$

$$I = \frac{E - V_{seuil}}{R + r_d} \qquad V = V_{seuil} + r_d I$$

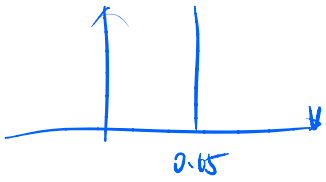
$$I = \frac{4.2 - 0.65}{0.2 + 0.002} = 17.6\,mA$$

$V = 0.65 + 0.002 \times 17.6$

$V = 0.685\,V = 685\,mV$

$V_{seuil} = 0.65\,V$

$R_d = 0\,\Omega$



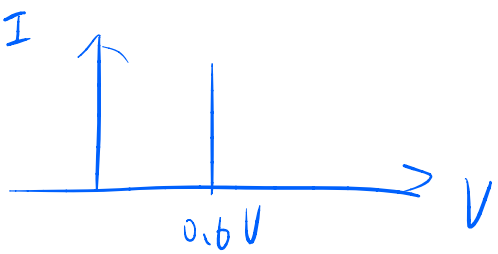
$$I = \frac{E - V_{seuil}}{R} \Rightarrow V = V_{seuil} = 0.65\,V$$

$$I = \frac{4.2 - 0.65}{0.2} = 17.8\,mA$$

Ne Manger rien ou je

$V_{seuil} = 0.6\,V$

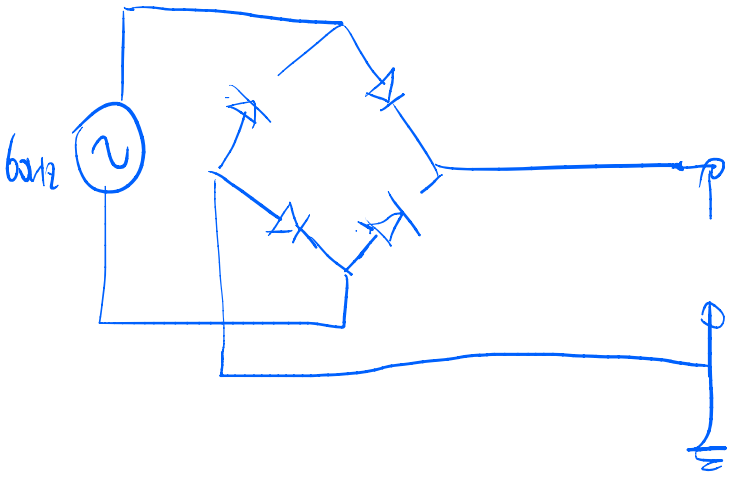
$r_d = 0$

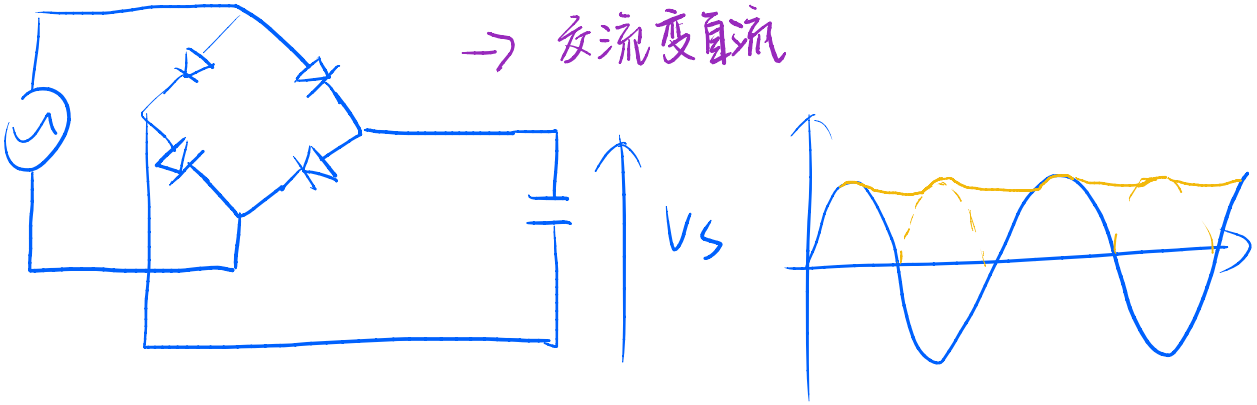


$$I = \frac{4.2 - 0.6}{} = 18\,mA \qquad V = V_{seuil} = 0.6\,V$$

$$E_{r\ldots} = \frac{18 - 17.9}{18} = 3\%$$

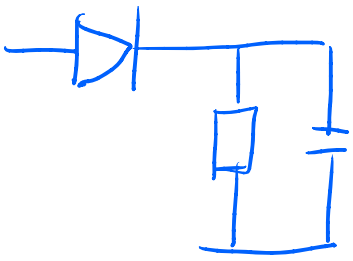
$$E = \frac{711 - 603}{711} = 15\%$$

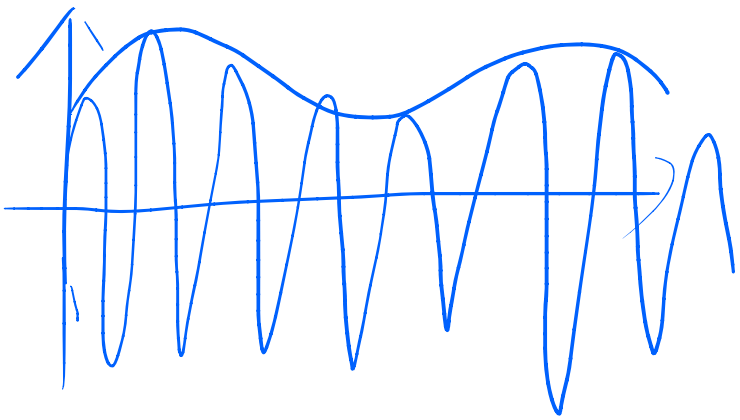




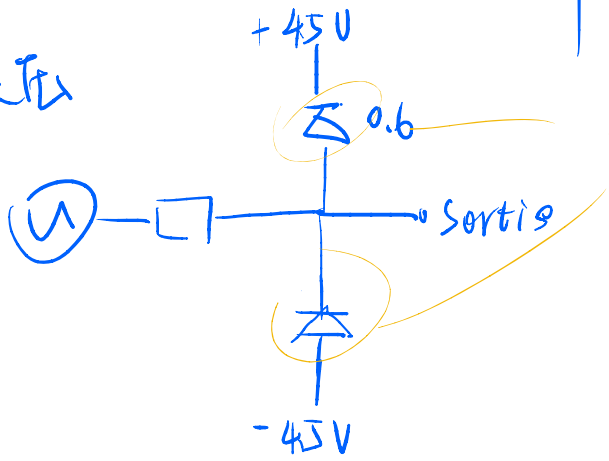
→ 交流变直流

高度检测





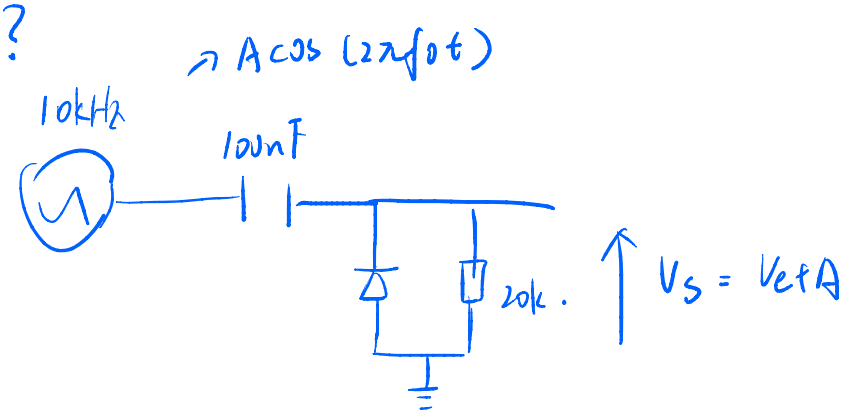
限压

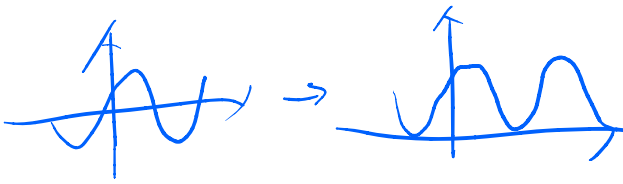


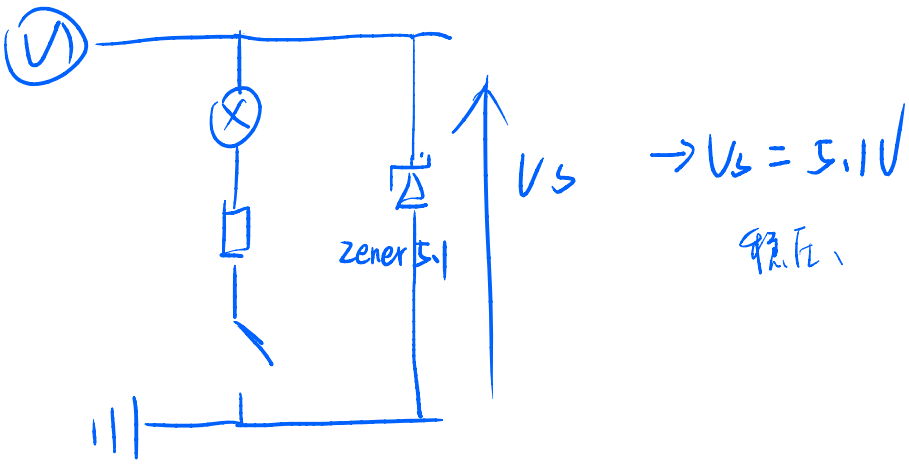
两二极

$$|sortie|_{max} = |45 + 0.6|$$

?







→ Vs = 5.1V

稳压.

交流变直流再稳压.