

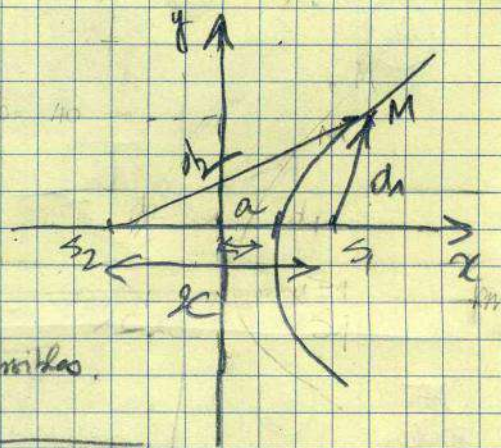
CORRIGE DE1 2012-13

GEOPOLYAN $c = 50 \text{ km}$ $\Delta t = 200 \mu\text{s}$

(Q1)

- $\Delta t = t_2 - t_1 = \frac{d_2 - d_1}{v} \Rightarrow d_2 - d_1 = \frac{\Delta t}{v} : \text{cte}$
 $\Rightarrow$ Tous les pts / $d_2 - d_1 = v \Delta t$ sont les positions possibles.

$\Rightarrow$ Hyperbole définie par $c = 50 \text{ km}$ $a = \frac{v \Delta t}{2} = 30 \text{ km}$



- Equation de H $\left[\left(\frac{x}{a} \right)^2 - \left(\frac{y}{b} \right)^2 = 1 \right]$ $b^2 = c^2 - a^2 = 50^2 - 30^2 = 1600$
 $\Rightarrow b = 40 \text{ km}$
 $\hookrightarrow$ Demo: Voir cours.

- Asymptote ($x \rightarrow \infty, y \rightarrow \infty$) $\left[y = \frac{b}{a} x \right]$

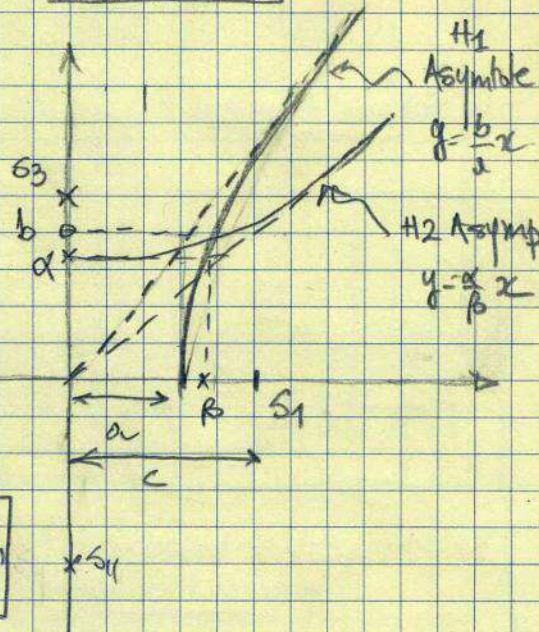
(Q2)

- Situation identique aux Q1 avec rotation $\pi/2$
 $\Rightarrow$ En permutant x et y , on arrive à une hyperbole H_2 de la forme:

$$\left(\frac{y}{\alpha} \right)^2 - \left(\frac{x}{\beta} \right)^2 = 1$$

avec

$$\alpha = v \frac{\Delta t}{2} = 37,5 \text{ km} \quad \beta = \sqrt{c^2 - \alpha^2} = 33,1 \text{ km}$$



- Asymptote $\left[y = \frac{\alpha}{\beta} x \right]$

- Limite: $\frac{b}{a} > \frac{\alpha}{\beta}$ sinon H_1 et H_2 ne se croisent pas.

$$\Rightarrow (\alpha x)^2 < (c^2 - \alpha^2)(c^2 - \alpha^2) \Rightarrow \alpha^2 - \alpha^2 < c^2$$

$$\Rightarrow \left[\Delta t^2 - \Delta t^2 < \left(\frac{2c}{v} \right)^2 \right]$$

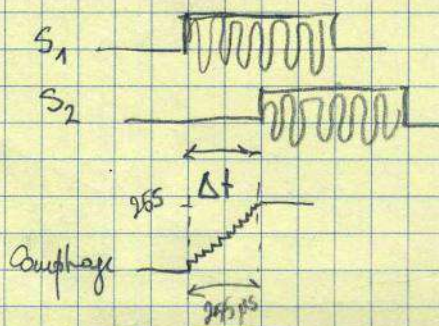
- Position exacte M $\left\{ \begin{array}{l} \left(\frac{x}{a} \right)^2 - \left(\frac{y}{b} \right)^2 = 1 \quad "x_b"$ $\left(\frac{b}{a} x \right)^2 - y^2 = b^2$ $"x_b"$
 $\left(\frac{y}{\alpha} \right)^2 - \left(\frac{x}{\beta} \right)^2 = 1 \quad "x_\alpha"$ $y^2 - \left(\frac{\alpha}{\beta} x \right)^2 = \alpha^2$ $"x_\alpha"$
 $\hookrightarrow 2 \text{ Eq} / 2 \text{ inc}$

$$\Rightarrow x = \frac{b^2 + \alpha^2}{\sqrt{\left(\frac{b}{a} \right)^2 - \left(\frac{\alpha}{\beta} \right)^2}} = 78 \text{ km}$$

$$y = b \sqrt{1 - \left(\frac{x}{a} \right)^2} = 96 \text{ km}$$

• L'indeterminé est levée avec le signe de Δt et Δt

Q3



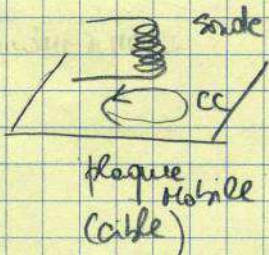
Freq d'horloge $|F = 1 \text{ MHz}|$ pour $\Delta t = 1 \mu\text{s}$ le + petit mesur

Sur erreur $\Delta t = 1 \mu\text{s}$ une position au sommet de l'oscil définie avec $\boxed{d = v \frac{\Delta t}{2} = 150 \text{ nm}}$

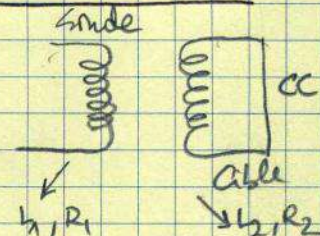
CAPT
POUC.

Q3

- Capteur à variation d'inductance
- Mesure petites distances



Modèle
Electrique

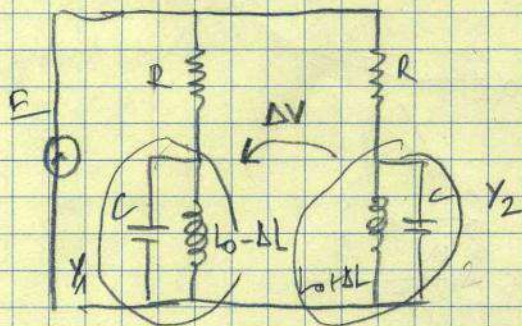


Cours: Inductance équivalent du primaire "Sonde"

$$L = L_1 - \frac{L_2 \omega^2 M^2(d)}{R_2^2 + (L_2 \omega)^2}$$

d = distance

• Schéma Equivalent



$\Delta L = 0 \Rightarrow$ les 2 branches présentent m admitt
 $\Rightarrow$ pont éq $\Rightarrow \Delta V = 0$

$$\Delta V = f(\Delta L) ?$$

$$L = L_0 \pm \Delta L = L_0 \left(1 \pm \frac{\Delta L}{L_0}\right)$$

$$NB: Y = j\omega C + \frac{1}{j\omega L} = j\omega C + \frac{1}{j\omega L_0 \left(1 \pm \frac{\Delta L}{L_0}\right)}$$

$$\boxed{Y \approx j\omega C + \frac{1}{j\omega L_0} \left(1 \mp \frac{\Delta L}{L_0}\right)}$$

$$\begin{cases} Y_1 = j\omega C + \frac{1}{j\omega L_0} \left(1 + \frac{\Delta L}{L_0}\right) \\ Y_2 = j\omega C + \frac{1}{j\omega L_0} \left(1 - \frac{\Delta L}{L_0}\right) \end{cases}$$

$$\Delta V = \left(\frac{1}{1 + RY_1} - \frac{1}{1 + RY_2} \right) E = \frac{R(Y_2 - Y_1)}{1 + R(Y_1 + Y_2)} \frac{E}{R^2 Y_1 Y_2}$$

$$Y_1 + Y_2 = j\omega C + \frac{1}{j\omega L_0}$$

$$Y_1 Y_2 = \left(j\omega C + \frac{1}{j\omega L_0} \right)^2 + \left(\frac{1}{L_0 \omega} \right)^2 \left(\frac{\Delta L}{L_0} \right)^2 \approx - \left(\omega - \frac{1}{L_0 \omega} \right)^2$$

2° ordre

$$Y_2 - Y_1 = - \frac{2}{j\omega L_0} \frac{\Delta L}{L_0}$$

$$\Rightarrow \Delta V = \frac{-2R}{j\omega L_0} \frac{1}{1 + R \left(j\omega C + \frac{1}{j\omega L_0} \right) - \left(\omega - \frac{1}{L_0 \omega} \right)^2} \cdot \frac{\Delta L}{L_0}$$

$$\Rightarrow \text{Amplitude } |\Delta V| = R \frac{\Delta L}{L_0}$$

Q4

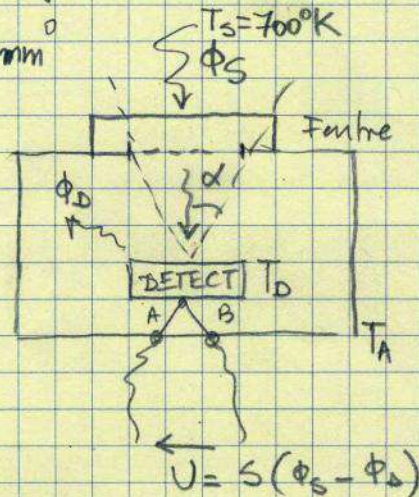
⇒ Amplitude

THERMO IR

Q5 • $R^0(T) = \int_0^\infty R^0(\lambda, T) d\lambda = \sigma T^4$

Q6 $R: W/m^2, \lambda_{max}: nm$

Q7



Data Sheet: Bonnes Tech

$\alpha = 90^\circ$

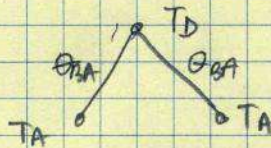
$S = 58 V/W$

$S_D = 0,61 mm^2$

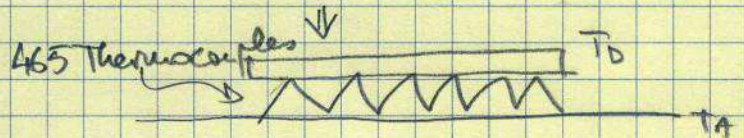
• $\Phi_s = \sigma T_s^4 \cdot S_D$ • $\Phi_a = \sigma T_A^4 \cdot S_D$ • $U = S \cdot S_D (\sigma T_s^4 - \sigma T_A^4)$

• AN $U = 5,67 \cdot 10^{-8} \times 58 \times 0,61 \times 10^{-6} \times 10^8 \times 58 \times 40 = 465 mV$
 $(49+9)(49-9)$

Q8 $\Theta_{RA} = 1000 \mu V/K$ $T_D - T_A = 1^\circ K$



$U = \Theta_{RA} (T_D - T_A) = 1 mV = \frac{U_{réel}}{465}$



Q9 • $T_s = 700 K \Rightarrow \lambda_{max} = 4000 nm = 4 \mu m$ (graphique)

$\Rightarrow$ Heißes Fenster: $\neq 3-8$

ca F_2

Gez. Filter (Ache)

F. 55 Attenué