

Exercice 7 (6 pts)

③ ① les différentes sortes de l'ondes:

- 1 } Onde qui ont besoin d'un support matériel,
- 1 } Onde qui n'ont pas " " " "
- 1 {
 - onde longitudinale ($\vec{u} \parallel \vec{v}$)
 - onde transversale ($\vec{u} \perp \vec{v}$)
 - Onde de cisaillement ($\vec{u} \perp \vec{v}$ et la direction de \vec{u} n'est pas constante.)
- 1 {
 - onde a 1 dimension
 - onde a 2 dimension
 - onde a 3 dimension

③ ② $\psi(x, t) = e(t - \frac{x}{c}) + s(t + \frac{x}{c})$

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- $\frac{\partial \psi}{\partial x} = e'(t - \frac{x}{c}) + s'(t + \frac{x}{c})$
- $\frac{\partial^2 \psi}{\partial x^2} = e''(t - \frac{x}{c}) + s''(t + \frac{x}{c})$

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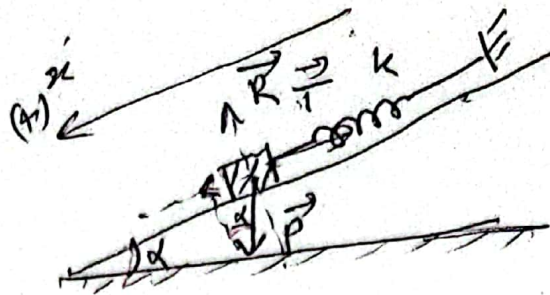
- $\frac{\partial \psi}{\partial x} = -\frac{1}{c} e'(t - \frac{x}{c}) + \frac{1}{c} s'(t + \frac{x}{c})$
- $\frac{\partial^2 \psi}{\partial x^2} = \frac{1}{c^2} [\underbrace{e''(t - \frac{x}{c}) + s''(t + \frac{x}{c})}_{\partial^2 \psi / \partial t^2}]$

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- $\frac{\partial^2 \psi}{\partial x^2} = \frac{1}{c^2} \frac{\partial^2 \psi}{\partial t^2}$
- $\frac{\partial^2 \psi}{\partial t^2} - c^2 \frac{\partial^2 \psi}{\partial x^2} = 0$ (equation de d'Alembert ou equation de propagation)

Exercice 2 (6pts)

- ① Le type de vibrations
① vibration libre non amortie



- ② L'équation du mouvement :

④ à l'équilibre: $\sum \vec{F} = \vec{0} \rightarrow \vec{P} + \vec{R} + \vec{T} = \vec{0}$.

or \backslash : $P \sin \alpha - T = 0$

$mg \sin \alpha - k \Delta l = 0$ c.é.

En mouvement: $\sum \vec{F} = m \vec{\gamma} \rightarrow \vec{P} + \vec{R} + \vec{T} = m \vec{\gamma}$.

or \backslash : $P \sin \alpha - T = m \gamma$

$mg \sin \alpha - k(\Delta l + x) = m \gamma \rightarrow -kx = m \ddot{x}$

$\ddot{x} + \frac{k}{m} x = 0$ eq. du mv.

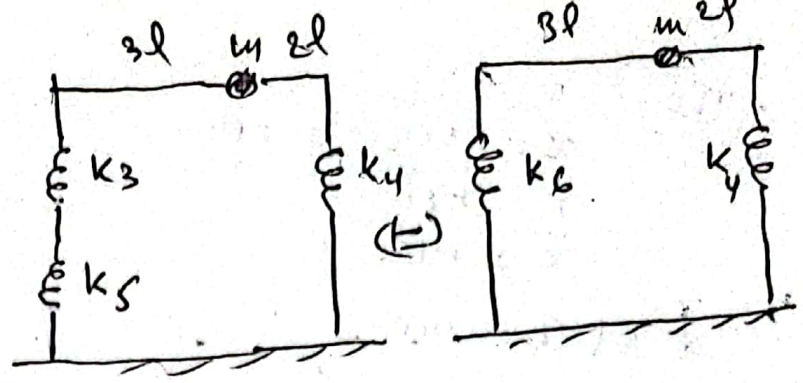
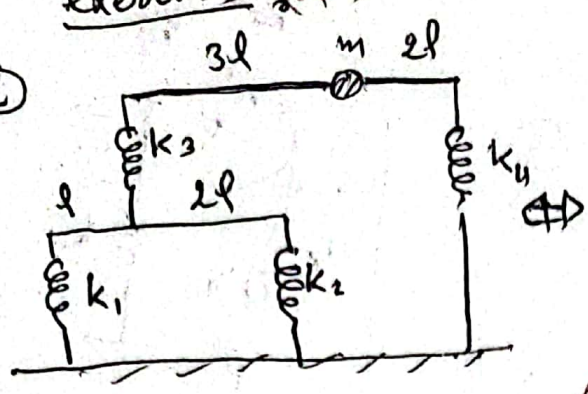
- ③ La solution de l'eq. du mv est de type sinusoïdal.

$x(t) = A \sin(\omega_0 t + \varphi)$ où $\omega_0 = \sqrt{k/m}$
 A, φ des constantes.

la période $T = \frac{2\pi}{\omega_0} \rightarrow T = 2\pi \sqrt{\frac{m}{k}}$

exercice 3 (8 pts)

(4) (1)



on remplace k_1 et k_2 par $k_5 \rightarrow k_5 = \frac{(3l)^2}{\frac{l^2}{k_2} + \frac{4l^2}{k_1}}$

$$k_5 = \frac{(9l^2)}{l^2 \left(\frac{1}{k_2} + \frac{4}{k_1} \right)} \rightarrow \frac{1}{k_5} = \frac{1}{9k_2} + \frac{4}{9k_1}$$

on remplace k_3 et k_5 par k_6

$$\frac{1}{k_6} = \frac{1}{k_3} + \frac{1}{k_5} = \frac{1}{k_3} + \frac{4}{9k_1} + \frac{1}{9k_2}$$

on remplace k_4 et k_6 par k_{eq} .

$$k_{eq} = \frac{(5l)^2}{\frac{9l^2}{k_4} + \frac{4l^2}{k_6}} = \frac{25l^2}{l^2 \left(\frac{9}{k_4} + \frac{4}{k_3} + \frac{16}{9k_1} + \frac{4}{9k_2} \right)}$$

$$k_{eq} = \frac{25}{25}$$

eq du mouvement: $\ddot{x} + \frac{k_{eq}}{m} x = 0$

$$T = \frac{2\pi}{\omega_0} \rightarrow T = 2\pi \sqrt{m/k_{eq}}$$

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Relevé de notes de la Matière: MVA

N°	Nom	prénoms	Matricule	TD	TP	EX
1	ABDELMALEK/عبد المالك	INES/إناس	222234134312	12.5	14	9
2	ABDESSELAM/عبد السلام	HAMMOU/حمو	222239532219	16	14.5	11
3	AICHAOUI/عيشاوي	AYOUB/أيوب	191937005630			
4	BECHACHHIA/بشاشحية	OUIAM/وئام	222236340103	12	14	7
5	BELMANAA/بلمانع	RAHMA/رحمة	222234028007	14.5	14	7
6	BENYAZZA/بن يزة	MANAR/منار	212234413303	10.5	13.5	4.5
7	CHETTOUH/شئوح	FATIMA/فطيمة	222234145408	10	13	4
8	DJEBBAR/جبار	HAKIMA/حكيمة	222234067719	18	15	16
9	GUEBAILI/قبابلي	HADIL/هديل	222236344407	13.5	13	11
10	HADJI/حاجي	Ouissam eddine/وسام الدين	222235047907	14	14.5	14
11	HALIMI/حليمي	AYA/آية	222236343903	11.5	13	3
12	HATTABI/حطابي	maima tadjelmolek/مة تاج الملك	222234137102	12.5	13	13
13	KAYA/كاية	CHAIMA/شيماء	222234028619	12	13.5	6.5
14	KHELEF/خلف	BDELLAH YUCEF/الله يوسف	212238230805	14.5	14	8.5
15	LAMRI/العمرى	RANIA/رانية	222234052208	12	13	6.5
16	LAMRI/العمرى	SELMA/سلمى	212234087203	13.5	13	5
17	MELLAK/ملاك	RANDA/رندي	212234192313	12.25	13	7.5
18	MERIOUMA/مريومه	DALIA/داليا	212139059394			
19	METIDJI/متيجي	RANIA/رانيا	212235460516	15.5	15	12
20	NESSAIB/نصايب	DOUNIA/دنيا	222236339707	11.75	13.5	5.5
21	SAADI/سعدى	DONIA/دنيا	222234137112	13.5	13	11
22	SAID/سعيد	Sadjed/ساجد	222236150806	12.25	14	11.5
23	SOUALHIA/صوالحية	AMINE/امين	222234119715	16.5	14.5	9
24	YAHIAOUI/يحياوي	AYA/آية	222234048004	11	13	5.5
25	ZAHAF/زحاف	ABDELLAH/عبد الله	212234088502	14.5	14.5	6
26	ZOUAIED/زويد	WASSILA/وسيلة	222234371503	13	13	7

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 P. Zerrouk
 2024