Note manuscrite

Carnet de n...	Premier carnet de notes		
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Onde stationnaire

$$\varphi(x,t) = f(x)\,g(t)$$

$$\frac{d^2 f(x)}{dx^2}\,g(t) - \frac{1}{c^2} f(x) \frac{d^2 g(t)}{dt^2} = 0$$

$$\frac{1}{f(x)} \frac{d^2 f(x)}{dx^2} = \frac{1}{c} \frac{1}{g(t)} \frac{d^2 g(t)}{dt^2} = cte$$

$$\frac{1}{f(x)} \frac{d^2 f(x)}{dx^2} = cte = K \quad (1)$$

$$\frac{1}{c^2} \frac{1}{g(t)} \frac{d^2 g(t)}{dt^2} = K \quad (2)$$

$$\frac{d^2 f(x)}{dx^2} - K f(x) = 0$$

$$\frac{d^2 g(x)}{dt^2} - Kc\,g(t) = 0$$

* Si $K > 0$ $\quad g(t) = Ae^{c\sqrt{K}t} + Be^{-c\sqrt{K}t}$

↳ divergente

$\Rightarrow$ impossible !

$*$ $K < 0$ $\qquad c^2 K = \omega^2$

$$g(t) = A\cos(\omega t - \varphi_g)$$

$$\Rightarrow \frac{d^2 f(x)}{dx^2} - \frac{\omega^2}{c^2} f(x) = 0$$

$$f(x) = B\cos\left(\frac{\omega}{c} t - \varphi_f\right)$$

Solution globale : $\Psi(x,t) = C\cos\left(\frac{\omega}{c} x - \varphi_f\right)\cos(\omega t - \varphi_g)$

en posant $k = \dfrac{\omega}{c}$

$$\boxed{\Psi(x,t) = C\cos(kx - \varphi_f)\cos(\omega t - \varphi_g)}$$