Values of $\vartheta = kx - \omega t$ at various points along a wave profile

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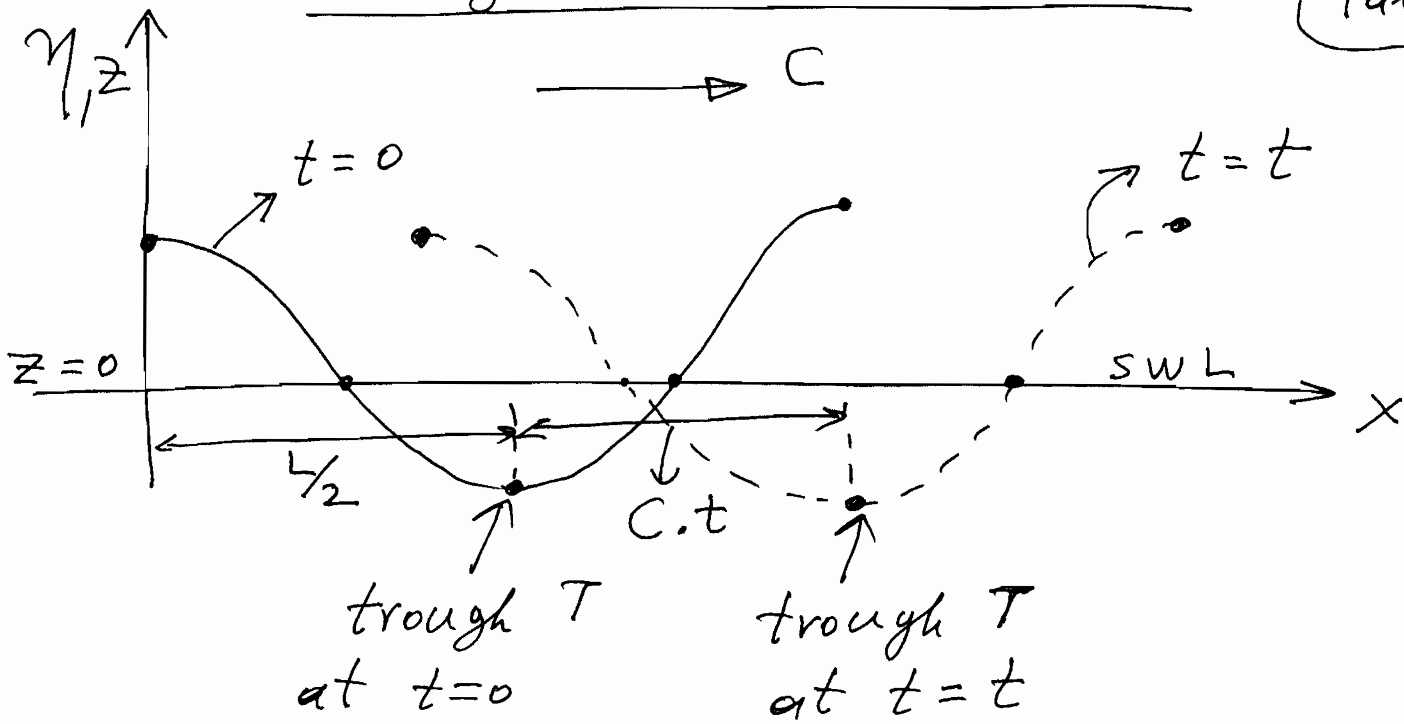
CE358
Fall '07



We call: $\vartheta = kx - \omega t$ (also called phase, not to be confused with φ)

Thus $\eta(x,t) = a\cos(kx - \omega t) = a \cdot \cos\vartheta$

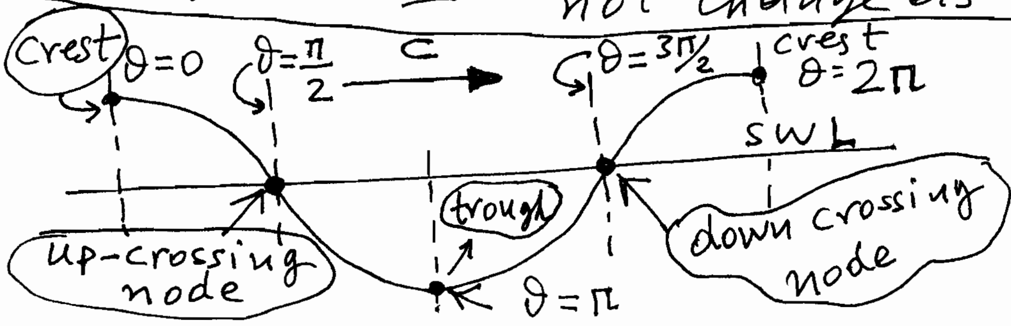
We want to see how ϑ at a given point (e.g. trough) changes as the wave propagates.

$$\vartheta^{Trough}_{t=0} = kx - \omega t = \frac{2\pi}{L} \cdot \frac{L}{2} - \omega \cdot 0 = \pi$$

$$\vartheta^{Trough}_{t=t} = k\left[\frac{L}{2} + C \cdot t\right] - \omega t = \frac{2\pi}{L} \cdot \frac{L}{2} + k \cdot C \cdot t - \omega t$$

($k \cdot C = \omega$, since $C = \frac{\omega}{k}$)

$\rightarrow \vartheta^{Trough}_{t=t} = \pi$ (the same! does not change as trough moves with wave)



→ ϑ for various points along the wave