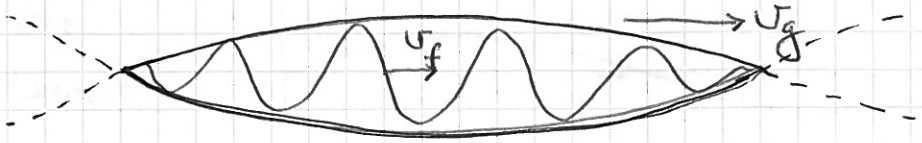
Gruppehastighet

Bærebølgen: $\sin[k(x - \frac{\omega}{k}t)] \Rightarrow v = \frac{\omega}{k} = v_f$

Modulasjonsbølgen: $\cos[\frac{\Delta k}{2}(x - \frac{\Delta\omega}{\Delta k}t)] \Rightarrow v = \frac{\Delta\omega}{\Delta k} \approx \frac{d\omega}{dk}$ når $\omega_2 \gtrsim \omega_1$

Gruppehastigheten: $\boxed{v_g = \frac{d\omega}{dk}}$

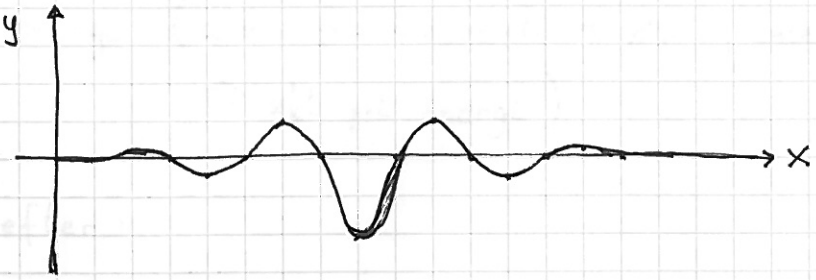


Uten dispersjon: $\omega(k) = v_f \cdot k \Rightarrow v_g = \frac{d\omega}{dk} = v_f$

Med —"— : $\omega(k)$ ikke lineær i k $\Rightarrow v_g \neq v_f$

$v_g = \frac{d}{dk}[v_f k] = v_f + k\frac{dv_f}{dk}$

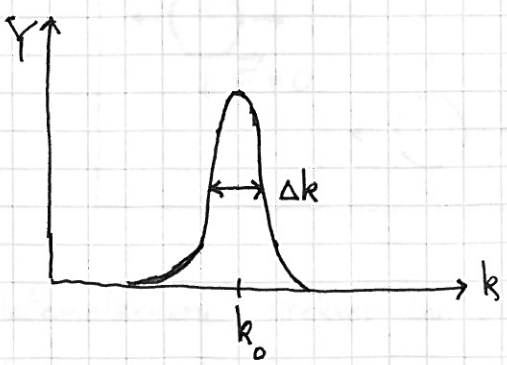
Bølgepakke:

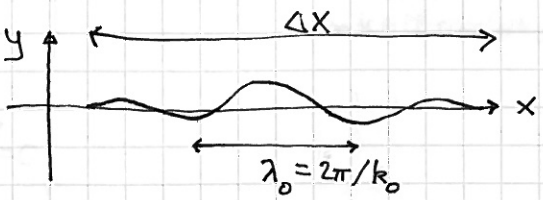


$$y(x,t) = \sum_k y_k \cos(kx - \omega t) \rightarrow \int dk\, Y(k) \cos(kx - \omega t)$$

$Y(k)$ = "andelen" av $\cos(kx - \omega t)$ i $y(x,t)$

Eks:





$\Delta k \cdot \Delta x \sim 2\pi$

Dvs: liten $\Delta k \Rightarrow$ stor Δx
stor $\Delta k \Rightarrow$ liten Δx

$\omega = \omega(k)$

$v_f = \omega(k_0)/k_0$; $v_g = (d\omega/dk)_{k=k_0}$