LECTURE 11

Bandwidth theorem

$$\Delta x \, \Delta k \geq \frac{1}{2} \qquad (\Delta t \, \Delta \omega \geq \frac{1}{2})$$

Δx: width of wave packet $f(x)$

Δk: width of Fourier transform $g(k)$

(origin of H.U.P.)

Dispersive waves

Phase velocity

$$v_p(k) = \left| \frac{\omega(k)}{k} \right| \quad \text{depends on } k$$

→ wave packet spreads out with time

Centre of packet travels at group velocity

$$v_g = \left| \frac{d\omega}{dk} \right|$$