Image Formation (37-45).

i). image bits

each pixel is 8 bits

each bit gives 6 dB

so 8 bits gives 48 dB

(video bandwith } is 56 dB)

human vision is 5-6 bits

ii) resolution

depends on task

for TV 576 x 576

determine from sampling the

a Fourier transform.

Here is a inverse Fourier transform

$$\text{time} = f(\text{frequency})$$

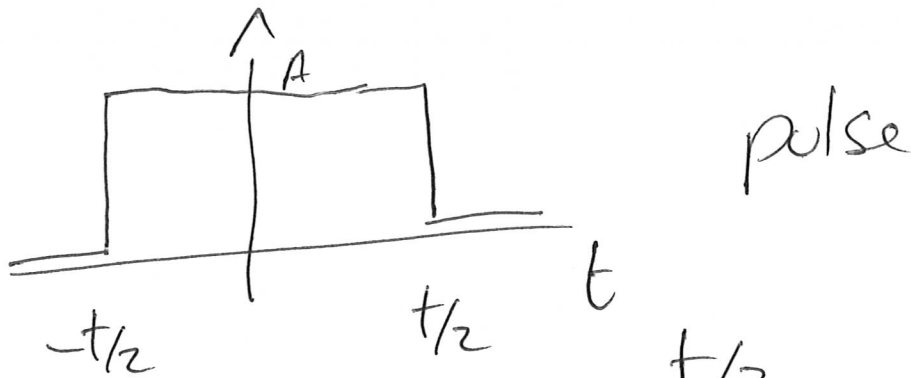$$F(\omega) = Re(\omega) + \text{imaginary} \quad \text{(3)}$$

Note

$$\text{Magnitude} = \sqrt{Re^2 + Im^2}$$

$$\text{Phase} = \tan^{-1}(Im / Re)$$

Here is a inverse Fourier transform

iv). applying the Fourier transform.

e.g. hitting it dash

$$F(\omega) = \int_{-t/2}^{t/2} A e^{-j\omega t} \, dt$$

pulse

$$= \left[\frac{A e^{-j\omega t}}{-j\omega} \right]_{-t/2}^{t/2}$$

$$= -A \left\{ \frac{1}{j\omega} \left(e^{j\omega t/2} - e^{+j\omega t/2} \right) \right\}$$

$$\sin(\omega t) = \frac{e^{j\omega t} - e^{-j\omega t}}{2j}$$

$$= \frac{2A}{\omega} \sin\left(\frac{\omega t}{2}\right).$$

(iii). Continuous Fourier transform

$$F(\omega) = \int_{-\infty}^{\infty} e^{-j\omega t} f(t) \, dt$$

Fourier (frequency) = sum(sine wave × time) over time

$$e^{-j\omega t} = \cos(\omega t) \mp j \sin(\omega t).$$

j = complex variable

Fourier = sine waves that make up a signal.