Subject :

Date : / /201

Finally

Lec.23

29/12

Laplace Transform
- Proofs
- Block diagram
- Simple problem
- Introduction

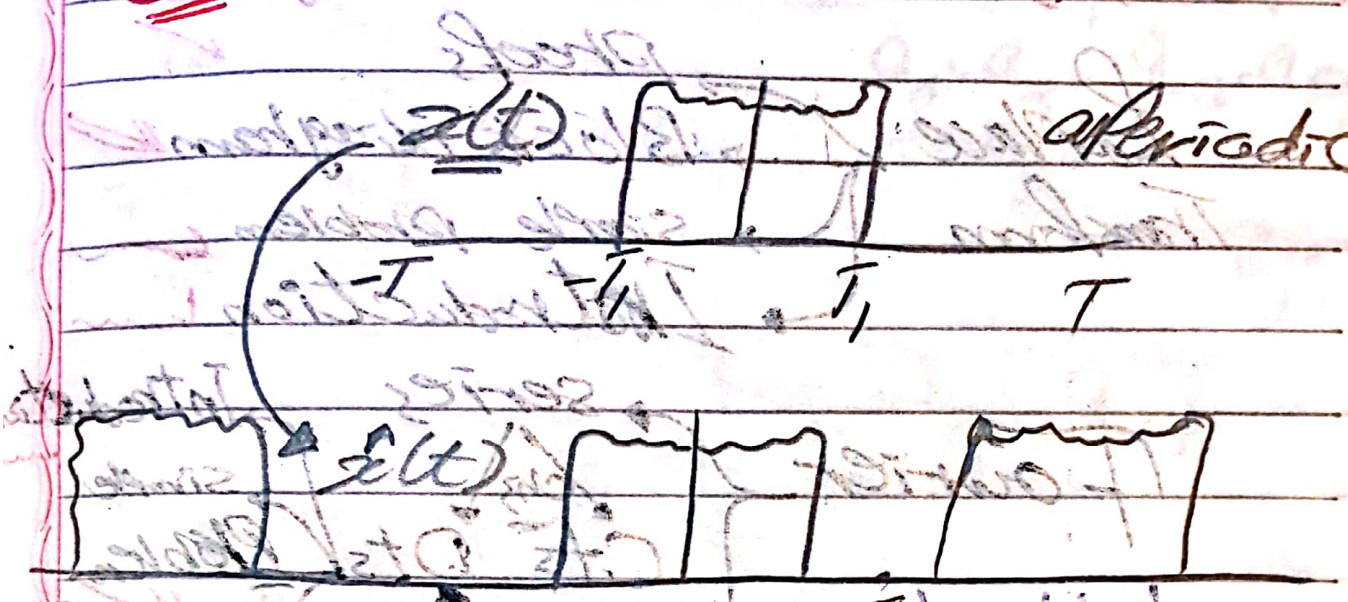
Fourier
- series
  - ch3
  - Cts
  - Dts
  - ch4
  - ch5
- Introduction
- simple Problem
- Proof
- Transform

جزء أول
150 %
جزء ثاني
Fourier - Laplace

Subject : موضوع الدرس :

Date : / / 201 التاريخ : / / 201

Ch4 CTS ← Fourier Transform



$$\hat{x}(t) = \sum_{k=-\infty}^{+\infty} a_k \, e^{jk\omega_0 t}$$

$$a_k = \frac{1}{T}\int_{T} \hat{x}(t)\, e^{-jk\omega_0 t}\, dt$$

$$\frac{1}{T}\int_{-\frac{T}{2}}^{\frac{T}{2}} \hat{x}(t)\, e^{-jk\omega_0 t}\, dt$$

Subject : _____ موضوع الدرس

Date : / /201 التاريخ : / / ٢٠١

$$\therefore a_k = \frac{1}{T}\int_{-\frac{T}{2}}^{\frac{T}{2}} x(t)\, e^{-jk\omega_0 t}\, dt$$

$$X(jk\omega_0) = \frac{1}{T}\int_{-\infty}^{+\infty} x(t)\, e^{-jk\omega_0 t}\, dt$$

Let $X(j\omega) = \int_{-\infty}^{+\infty} x(t)\cdot e^{-j\omega t}\, dt$

$$\therefore a_k = \frac{1}{T}\, X(jk\omega_0)$$

as $X(j\omega) = \int_{-\infty}^{+\infty} x(t)\, e^{-j\omega t}\, dt$

$$\therefore \hat{x}(t) = \sum_{k=-\infty}^{+\infty} a_k\, e^{jk\omega_0 t}$$

$$x(t) = \sum_{k=-\infty}^{+\infty} \frac{1}{T} X(jk\omega_0)\, e^{jk\omega_0 t}$$

Subject :

Date : / /201

موضوع الدرس :

التاريخ : / / ٢٠١

$$\omega_0 = \frac{2\pi}{T} \Rightarrow \frac{\omega_0}{2\pi} = \frac{1}{T}$$

$\omega_0 \propto \frac{1}{T}$

$T \propto \frac{1}{\omega_0}$

$$\hat{x}(t) = \sum_{k=-\infty}^{+\infty} \frac{1}{2\pi} X(jk\omega_0) e^{jk\omega_0 t} \cdot \omega_0$$

$$\hat{x}(t) = \frac{1}{2\pi} \sum_{k=-\infty}^{+\infty} X(jk\omega_0) e^{jk\omega_0 t} \cdot \omega_0 \cdot d\omega$$

$\omega = k\omega_0$ $\quad +\infty \quad k=-\infty$

$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} X(j\omega) e^{j\omega t} d\omega$$

$T \to \infty$

$\omega_0 \to 0 \Rightarrow d\omega$

Inverse fourier

Synthesis eqn - Transform

$\hat{x}(t) \to x(t)$

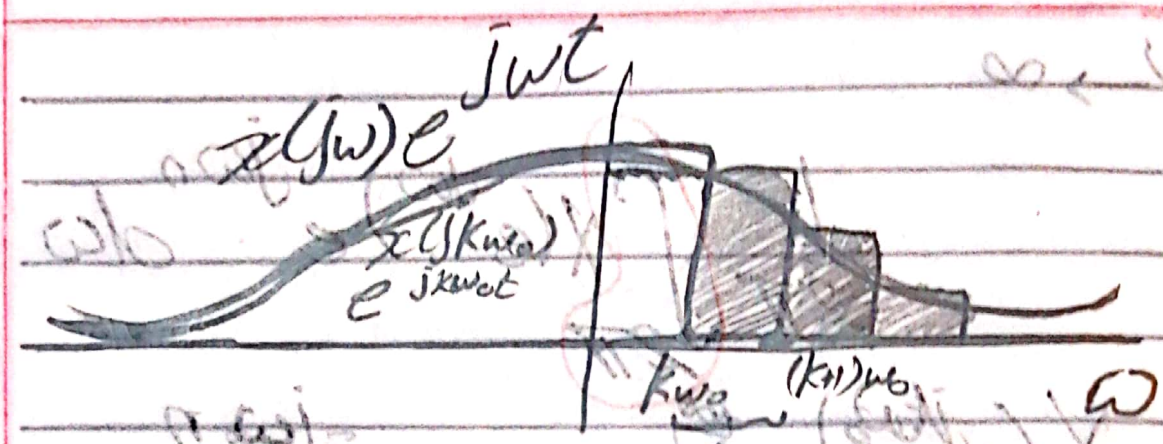
$\sum \to \int$

$$X(j\omega) = \int_{-\infty}^{+\infty} x(t) e^{-j\omega t} dt \Rightarrow \text{Fourier Transform}$$

Analysis eqn.

Subject :

Date : / /201



$$X(jkw_0)\cdot e^{jkw_0t}\cdot w_0$$

Periodic

$$a_k = \frac{1}{T}X(jkw_0)$$

One Period

$$= \frac{1}{T}X(jw)\Big|_{w=kw_0}$$

$$kw_0 = k\cdot\frac{2\pi}{N} \qquad \frac{2\pi}{N}$$

$$\langle N \rangle \qquad (2\pi)$$

$$\hat{x}[n] = \frac{1}{2\pi}\sum_{k=\langle N\rangle} X(e^{jkw_0})\,e^{jkw_0n}\cdot w_0$$

Subject :

Date : / / 201

موضوع الدرس :

التاريخ : / / ٢٠١

$N \to \infty$

$$= \frac{1}{2\pi} \int_{2\pi} X(e^{j\omega}) e^{j\omega n} d\omega$$

$$X(e^{jk\omega_0}) = \sum_{k=-\infty}^{\infty} x[n] e^{-jk\omega_0 n}$$

$\omega + 2\pi$

$$e^{-j\omega n} \quad e^{-j(\omega+2\pi)n}$$

$$e^{-j\omega n} \cdot e^{-j2\pi n}$$

$$e^{-j\omega n} \cdot [e^{-j2\pi}]^n = 1$$