

從信號與系統到控制

單元：連續F轉換-5

傅立葉轉換 範例 - 脈衝函數

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單元學習目標與大綱

- 根據 **傅立葉轉換** 的公式與關係式
- 計算 **脈衝函數** 的 **傅立葉轉換**

傅立葉轉換 的 表示式

$$x(t) \xleftrightarrow{\text{FT}} X(j\omega)$$

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

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

脈衝函數的傅立葉轉換

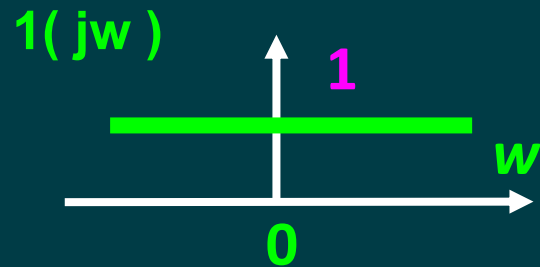
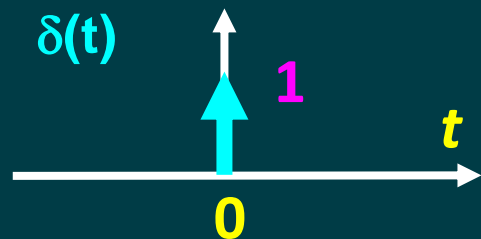
$$x(t) = \delta(t)$$

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

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

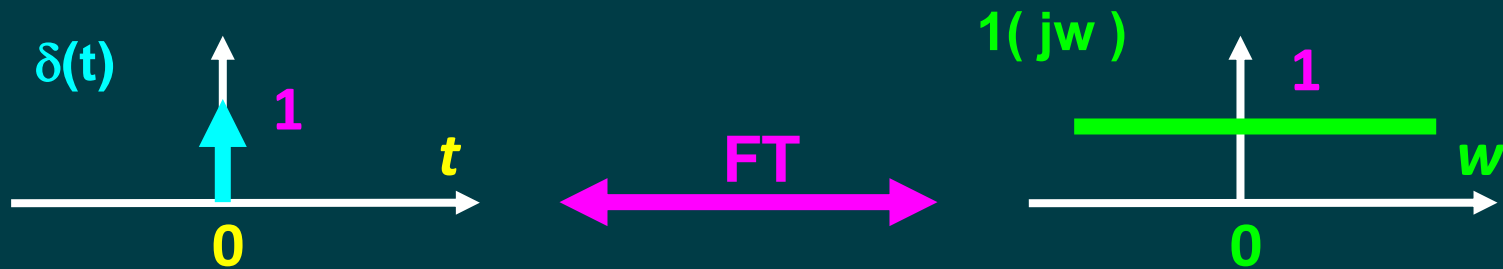
$$= 1 e^{-j\omega 0}$$

$$= 1 = 1(j\omega)$$



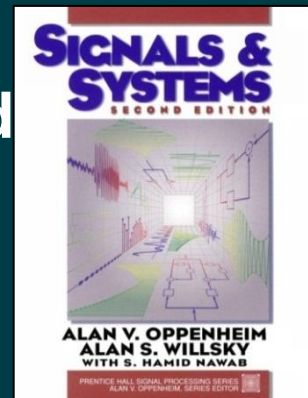
脈衝函數的傅立葉轉換

$$\delta(t) \xleftrightarrow{\text{FT}} 1(j\omega)$$



參考文獻

- Alan V. Oppenheim, Alan S. Willsky, S. Hamid
Signals & Systems,
Prentice Hall, 2nd Edition, 1997



- **SciLab:**
Open source software for numerical computation
<http://www.scilab.org/>