

$$\mathcal{L}\{f(t) * g(t)\} = \mathcal{L}\left\{\int_0^t f(\tau) \cdot g(t - \tau) d\tau\right\} \\ = \mathcal{L}\{f(t)\} \cdot \mathcal{L}\{g(t)\}$$

$$\mathcal{L}\{f(t) \odot g(t)\} = \mathcal{L}\left\{\int_0^t f(\tau) \cdot g(t - \tau) d\tau\right\}$$

$$\mathcal{L}\{f(t) \odot g(t)\} = \mathcal{L}\{f(t)\} \cdot \mathcal{L}\{g(t)\}$$



Calcular  $\mathcal{L}\{ \}$  de :

$$1) \mathcal{L}\{1 * t^2\} = \mathcal{L}\left\{\int_0^t f(\tau) g(\underline{t-\tau}) d\tau\right\}$$

$$\begin{array}{ccc} \downarrow & & \downarrow \\ t-\tau & & \tau \\ \downarrow & & \downarrow \\ g(t-\tau) & & f(\tau) \end{array}$$

$$\mathcal{L}\left\{\int_0^t \tau^2 d\tau\right\}$$

$$\mathcal{L}\left\{\frac{\tau^3}{3}\bigg|_0^t\right\} \rightarrow \mathcal{L}\left\{\frac{t^3}{3}\right\}$$

$$\mathcal{L}\{1 * t^2\} = \frac{1}{3} \left[ \frac{3!}{s^4} \right] = \frac{2}{s^4}$$

$$(*) \mathcal{L}\{t * t^2\} = \mathcal{L}\left\{\int_0^t (t-\tau)^2 d\tau\right\}$$

Calcular  $\mathcal{L}\{ \}$  de :

$$2) \mathcal{L}\{t * e^t\} = \mathcal{L}\left\{\int_0^t f(\tau) \cdot g(t-\tau) d\tau\right\}$$

$\downarrow$   
 $t-\tau$   
 $\downarrow$   
 $g(t-\tau)$

$\downarrow$   
 $\tau$   
 $\downarrow$   
 $f(\tau)$

$$\mathcal{L}\left\{\int_0^t e^{\tau} \cdot (t-\tau) d\tau\right\}$$

$$\mathcal{L}\left\{t \int_0^t e^{\tau} d\tau - \int_0^t e^{\tau} \tau d\tau\right\}$$

$$\mathcal{L}\left\{t \left[ e^{\tau} \Big|_0^t \right] - \left[ \tau e^{\tau} - e^{\tau} \Big|_0^t \right] \right\}$$

$$\mathcal{L}\left\{t (e^t - 1) - [t e^t - e^t + 1] \right\}$$

$\tau$	$\int$
$1$	$\oplus e^{\tau}$
$0$	$\ominus e^{\tau}$
$0$	$\ominus e^{\tau}$

$$\mathcal{L}\{t * e^t\} = \mathcal{L}\{-t + e^t - 1\} = \left[ -\frac{1}{s^2} + \frac{1}{s-1} - \frac{1}{s} \right] = \left[ \frac{-(s-1) + s^2 - s(s-1)}{s^2(s-1)} \right]$$

$$\mathcal{L}\{t * e^t\} = \left[ \frac{-s + 1 + s^2 - s^2 + s}{s^2(s-1)} \right] = \frac{1}{s^2(s-1)}$$



Calcular  $\mathcal{L}\{ \}$  de :

$$1) \mathcal{L}\{1 * t^2\} = \mathcal{L}\{f(t)\} \cdot \mathcal{L}\{g(t)\}$$

$$= \mathcal{L}\{1\} \cdot \mathcal{L}\{t^2\}$$

$$= \left(\frac{1}{s}\right) \cdot \left(\frac{2!}{s^3}\right)$$

$$= \frac{2}{s^4}$$

$$2) \mathcal{L}\{t * e^t\}$$

$$\mathcal{L}\{t * e^t\} = \mathcal{L}\{f(t)\} \cdot \mathcal{L}\{g(t)\}$$

$$= \mathcal{L}\{t\} \cdot \mathcal{L}\{e^t\}$$

$$= \left(\frac{1}{s^2}\right) \cdot \left(\frac{1}{s-1}\right)$$

$$= \frac{1}{s^2(s-1)}$$