

# ES N152 PAG 157

$$\lim_{x \rightarrow 0} \frac{1 - \cos^2 \omega x}{1 - \cos^2 \sigma x} = \left[ \frac{0}{0} \text{ F.I.} \right] (*)$$

$\Downarrow$   
 DE L'HOPITAL

$$\lim_{x \rightarrow 0} \frac{-2 \cos \omega x (-\sin \omega x) \omega}{-2 \cos \sigma x (-\sin \sigma x) \sigma} =$$

$$= \lim_{x \rightarrow 0} \frac{2 \omega \sin \omega x \cos \omega x}{2 \sigma \sin \sigma x \cos \sigma x} =$$

$$= \lim_{x \rightarrow 0} \frac{\omega \sin 2\omega x}{\sigma \sin 2\sigma x} = \left[ \frac{0}{0} \text{ F.I.} \right] \text{ LIMITE NOTÉVABLE}$$

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$= \lim_{x \rightarrow 0} \frac{\omega \cancel{\omega} \cos 2\omega x}{\sigma \cancel{\sigma} \cos 2\sigma x} = \frac{\omega^2}{\sigma^2}$$

$$(*) = \lim_{x \rightarrow 0} \frac{\sin^2 \omega x}{\sin^2 \sigma x} \cdot \left( \frac{\omega x}{\omega x} \right)^2 \left( \frac{\sigma x}{\sigma x} \right)^2 =$$

$$= \lim_{x \rightarrow 0} \left( \frac{\sin \omega x}{\omega x} \right)^2 \frac{\omega^2 \cancel{x^2}}{\sigma^2 \cancel{x^2}} \frac{1}{\left( \frac{\sin \sigma x}{\sigma x} \right)^2} = \frac{\omega^2}{\sigma^2}$$