Résumé -Chapitre I-

Relations Trigonométriques

$\cos(-\alpha) = \cos\alpha$

$\cos\alpha = \sin(\alpha + \frac{\pi}{2})$

$\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

$\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha = 2\cos^2\alpha - 1 = 1 - 2\sin^2\alpha$

$\cos\alpha\cos\beta = \frac{1}{2}\left[\cos(\alpha-\beta) + \cos(\alpha+\beta)\right]$

$\cos^2\alpha + \sin^2\alpha = 1$

$\cos^2\alpha = \frac{1+\cos 2\alpha}{2}$

$\cos\alpha + \cos\beta = 2\cos\left(\frac{\alpha-\beta}{2}\right)\cos\left(\frac{\alpha+\beta}{2}\right)$

$\sin(-\alpha) = -\sin\alpha$

$\sin\alpha = \cos(\alpha - \frac{\pi}{2})$

$\sin(\alpha - \beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

$\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

$\sin 2\alpha = 2\sin\alpha\cos\alpha$

$\sin\alpha\sin\beta = \frac{1}{2}\left[\cos(\alpha-\beta) - \cos(\alpha+\beta)\right]$

$\sin\alpha\cos\beta = \frac{1}{2}\left[\sin(\alpha-\beta) + \sin(\alpha+\beta)\right]$

$\sin^2\alpha = \frac{1-\cos 2\alpha}{2}$

$\sin\alpha + \sin\beta = 2\cos\left(\frac{\alpha-\beta}{2}\right)\sin\left(\frac{\alpha+\beta}{2}\right)$

Nombres Complexes ($j^2 = -1$)

$\underline{\mathcal{Z}} = x + jy$ $\qquad x = A\cos\phi \;,\; y = A\sin\phi$ $\qquad \underline{\mathcal{Z}} = A\cos\phi + jA\cos\phi$

$\underline{\mathcal{Z}}^* = x - jy$ $\qquad \tan\phi = \frac{y}{x} = \frac{\mathrm{Im}(\underline{\mathcal{Z}})}{\mathrm{Re}(\underline{\mathcal{Z}})}$ $\qquad \underline{\mathcal{Z}}^* = A\cos\phi - jA\cos\phi$

$|\underline{\mathcal{Z}}| = \sqrt{\underline{\mathcal{Z}}\underline{\mathcal{Z}}^*} = \sqrt{x^2+y^2} = A$ $\qquad \cos\phi + j\sin\phi = e^{j\phi}$ $\qquad \underline{\mathcal{Z}} = Ae^{j\phi} \;,\; \underline{\mathcal{Z}}^* = Ae^{-j\phi}$

$\underline{\mathcal{Z}}_1\underline{\mathcal{Z}}_2 = A_1e^{j\phi_1}A_2e^{j\phi_2} = A_1A_2e^{j(\phi_1+\phi_1)}$ $\qquad \frac{\underline{\mathcal{Z}}_1}{\underline{\mathcal{Z}}_2} = \frac{A_1e^{j\phi_1}}{A_2e^{j\phi_2}} = \frac{A_1}{A_2}e^{j(\phi_1-\phi_2)}$ $\qquad |\underline{\mathcal{Z}}_1\underline{\mathcal{Z}}_2| = |\underline{\mathcal{Z}}_1|\,|\underline{\mathcal{Z}}_2|$ $\qquad \left|\frac{\underline{\mathcal{Z}}_1}{\underline{\mathcal{Z}}_2}\right| = \frac{|\underline{\mathcal{Z}}_1|}{|\underline{\mathcal{Z}}_2|}$

Dérivées

$\frac{d}{dx}(\cos x) = -\sin x$

$\frac{d}{dx}(x^n) = nx^{n-1}$

$\frac{d}{dx}(\ln x) = \frac{1}{x}$

$\frac{d}{dx}(\sin x) = \cos x$

$\frac{d}{dx}(e^{ax}) = ae^{ax}$

$\frac{d}{dx}(fg) = \frac{df}{dx}g + f\frac{dg}{dx} \;,\; \frac{d}{dx}f(g(x)) = \frac{\partial f}{\partial g}\frac{dg}{dx}$

Intégrales

$\int \cos x\; dx = \sin x + C$

$\int x^n\; dx = \frac{1}{n+1}x^{n+1} + C$

$\int e^{ax}\; dx = \frac{1}{a}e^{ax} + C$

$\int \sin x\; dx = -\cos x + C$

$\int \frac{1}{x}dx = \ln|x| + C$

$\int fg\; dx = fG - \int \frac{df}{dx}G\; dx \quad (G = \int g\; dx)$

Séries de Fourier

$$f(t) = a_0 + \sum_{n=1}^{\infty} a_n\cos n\omega t + \sum_{n=1}^{\infty} b_n\sin n\omega t \qquad (\omega = 2\pi/T)$$

$$a_0 = \frac{1}{T}\int_0^T f(t)\; dt \qquad a_n = \frac{2}{T}\int_0^T f(t)\cos n\omega t\; dt \qquad b_n = \frac{2}{T}\int_0^T f(t)\sin n\omega t\; dt$$