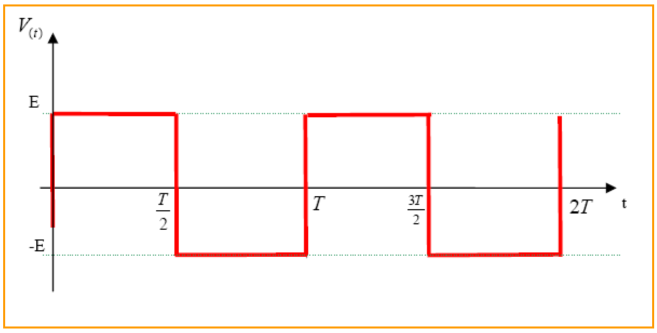
CALCUL D'UNE DSF

exemple 1 calcul en t

$$V_{(t)} = A_o + \sum_{n=1}^{\infty} A_n.\cos(n\omega t) + B_n.\sin(n\omega t)$$

$$A_o = \frac{1}{2.\pi}\int_T V_{(t)} dt = 0$$



La fonction est impaire $V_{(t)} = -V_{(-t)}$ **alors les termes en A_n sont nuls**

$$B_n = \frac{2}{T}\int_T V_{(t)}.\sin(n\omega t)dt = \frac{2E}{T}\left(\int_0^{\frac{T}{2}} \sin(n\omega t)dt - \int_{\frac{T}{2}}^{T}\sin(n\omega t)dt\right) = \frac{4.E}{T}\int_0^{\frac{T}{2}}\sin(n\omega t)dt$$

$$= \frac{4.E}{n\omega T}\left[-\cos(n\omega t)\right]_0^{\frac{T}{2}} = \frac{2.E}{n\pi}\left[-\cos(n\pi)+1\right] = \frac{2.E}{n\pi}\left(1-(-1)^n\right)$$

$$-\sin\omega\left(t+\frac{T}{2}\right) = \sin\omega t$$

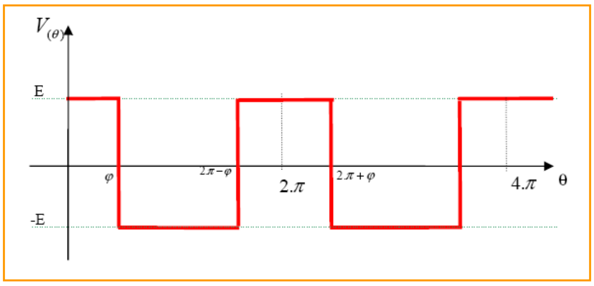
$$\boxed{B_n = \frac{2.E}{n\pi}\left(1-(-1)^n\right)} \quad \boxed{B_1 = \frac{4.E}{\pi}} \quad \boxed{B_2 = 0} \quad \boxed{B_3 = \frac{4.E}{3.\pi}}$$

$$\boxed{V_{(t)} = A_o + \sum_{n=1}^{\infty}\left(A_n.\cos(n\omega t) + B_n.\sin(n\omega t)\right) = \sum_{n=1}^{\infty}\left(\frac{4E}{n\pi}.\left(1-(-1)^n\right)\sin(n\omega t)\right)}$$

exemple 2 calcul en θ

$$V_{(\theta)} = A_o + \sum_{n=1}^{\infty} A_n.\cos(n\theta) + B_n.\sin(n\theta)$$

$$A_o = \frac{1}{2.\pi}\int_{2.\pi} V_{(\theta)}d\theta = \frac{1}{2.\pi}\left(2.E.\varphi - 2.E(\pi-\varphi)\right) = -\frac{E}{\pi}(\pi - 2\varphi) \qquad A_o = E\left(2\frac{\varphi}{\pi}-1\right)$$



La fonction est paire $V_{(\theta)} = V_{(-\theta)}$ **alors les termes en B_n sont nuls**

$$A_n = \frac{2}{2.\pi}\int_{2\pi} V_{(\theta)}.\cos(n\theta)d\theta = \frac{2}{2.\pi}E\left(\int_0^{\varphi}\cos(n\theta)d\theta - \int_{\varphi}^{2.\pi-\varphi}\cos(n\theta)d\theta + \int_{2.\pi-\varphi}^{2.\pi}\cos(n\theta)d\theta +\right)$$

$$= \frac{E}{n.\pi}\left(\left[\sin(n\theta)\right]_0^{\varphi} - \left[\sin(n\theta)\right]_{\varphi}^{2.\pi-\varphi} + \left[\sin(n\theta)\right]_{2.\pi-\varphi}^{2.\pi}\right) = \frac{E}{n\pi}\left(\sin(n\varphi) - \sin n(2.\pi-\varphi) + \sin(n\varphi) - \sin n(2.\pi - \varphi)\right)$$

$$A_n = \frac{4E}{n\pi}.\sin(n\varphi)$$

$$\boxed{V(\theta) = A_o + \sum_{n=1}^{\infty}\left(A_n.\cos(n\theta) + B_n.\sin(n\theta)\right) = E\left(2\frac{\theta}{\pi}-1\right) + \sum_{n=1}^{\infty}\left(\frac{4E}{n\pi}.\sin(n\varphi).\cos(n\theta)\right)}$$

On vérifie avec une DSF connue, $\varphi = \frac{\pi}{2}$**, et on trouve** $\boxed{A_1 = \frac{4.E}{\pi}}$, $\boxed{A_2 = 0}$, $\boxed{A_3 = -\frac{4.E}{3.\pi}}$