

Exercices corrigés
sur le TZ
2APP

Notes Compléter :

$$T_z (U(k-1)) =$$

$$T_z (3^k \cdot U(k)) =$$

$$T_z ((k-1) \cdot U(k)) =$$

$$T_z (4^k \cdot U(k-3)) =$$

$$T_z \left(\cos\left(\frac{k\pi}{6}\right) \cdot U(k) \right) =$$

Notes Compléter :

$$T_z (u(k-1)) = z^{-1} \cdot T_z (u(k)) = z^{-1} \cdot \frac{z}{z-1} = \frac{1}{z-1}$$

↓ ↑
retard de 1

$$T_z (3^k \cdot u(k)) = \frac{z}{z-3}$$

$$T_z ((k-1) \cdot u(k)) = T_z (k \cdot u(k)) - T_z (u(k)) = \frac{z}{(z-1)^2} - \frac{z}{z-1}$$

$$T_z (4^k \cdot u(k-3)) = z^{-3} \cdot T_z (4^{k+3} \cdot u(k)) = z^{-3} \cdot 64 \cdot \frac{z}{z-4} = 64 \cdot \frac{z^{-2}}{z-4} = 64 \cdot \frac{1}{z^2(z-4)}$$

↓ ↑ ||
retard de 3 k 4 · 4³

$$T_z \left(\cos\left(\frac{k\pi}{6}\right) \cdot u(k) \right) = \frac{z^2 - z \cos \frac{\pi}{6}}{z^2 - 2z \cos \frac{\pi}{6} + 1} = \frac{z^2 - z \frac{\sqrt{3}}{2}}{z^2 - z \sqrt{3} + 1}$$

Notes $T_z \left((k^2 - 4) \cdot U(k-2) \right) =$

$$T_z \left(\sin \left(k \frac{\pi}{3} + \frac{\pi}{2} \right) \cdot U(k) \right) =$$

$$T_z \left(\sin \left(k \frac{\pi}{3} + \frac{\pi}{6} \right) \cdot U(k-1) \right) =$$

$$T_z^{-1} \left(\frac{z}{z-3} \right) =$$

$$T_z^{-1} \left(\frac{z}{2z-5} \right) =$$

Notes: $T_z \left((k^2 - 4) \cdot U(k-2) \right) = z^{-2} \cdot T_z \left((k+2)^2 + 4 \right) = z^{-2} \cdot T_z \left(k^2 + 4k + 8 \right)$

retard de 2 \uparrow

$$= z^{-2} \cdot \left(\frac{z(z+1)}{(z-1)^2} + 4 \frac{z}{(z-1)^2} + 8 \frac{z}{z-1} \right) = z^{-1} \cdot (\dots)$$

$$T_z \left(\sin \left(k \frac{\pi}{3} + \frac{\pi}{2} \right) \cdot U(k) \right) = \frac{z^2 - z \cos \frac{\pi}{3}}{z^2 - 2z \cos \frac{\pi}{3} + 1} = \frac{z^2 - z/2}{z^2 - z + 1}$$

$$\sin \left(\frac{k\pi}{3} \right) \cos \frac{\pi}{2} + \sin \frac{\pi}{2} \cdot \cos \left(\frac{k\pi}{3} \right) = \cos \left(\frac{k\pi}{3} \right)$$

$$T_z \left(\sin \left(k \frac{\pi}{3} + \frac{\pi}{6} \right) \cdot U(k-1) \right) = z^{-1} \cdot T_z \left(\sin \left((k+1) \frac{\pi}{3} + \frac{\pi}{6} \right) \cdot U(k) \right) = z^{-1} \cdot T_z \left(\sin \left(k \frac{\pi}{3} + \frac{3\pi}{6} \right) \cdot U(k) \right)$$

retard de 1 \uparrow

$$= z^{-1} \frac{z^2 - z/2}{z^2 - z + 1} = \frac{z - 1/2}{z^2 - z + 1}$$

$$T_z^{-1} \left(\frac{z}{z-3} \right) = 3^k \cdot U(k)$$

$$T_z^{-1} \left(\frac{z}{2z-5} \right) = T_z^{-1} \left(\frac{z}{2(z-5/2)} \right) = \frac{1}{2} \cdot T_z^{-1} \left(\frac{z}{z-5/2} \right) = \frac{1}{2} T_z^{-1} \left(\frac{z}{z-5/2} \right) = \frac{1}{2} \left(\frac{5}{2} \right)^k U(k)$$

$$\begin{aligned} \textcircled{*} T_z \left(k^2 \cdot U(k) \right) &= T_z \left(k \cdot k U(k) \right) = -z F'(z) \text{ où } F(z) = T_z \left(k \cdot U(k) \right) = \frac{z}{(z-1)^2} \\ &= -z \frac{(z-1)^2 - 2z(z-1)}{(z-1)^4} = -z \frac{-z-1}{(z-1)^3} = \frac{z(z+1)}{(z-1)^3} \end{aligned}$$

Notes $T_z^{-1} \left(\frac{1}{z-1} \right) =$

$$T_z^{-1} \left(\frac{1}{z^2(z-2)} \right) =$$

$$T_z^{-1} \left(\frac{z}{z+3} \right) =$$

$$T_z^{-1} \left(\frac{z}{z^2-z+1} \right) =$$

$$T_z^{-1} \left(\frac{1}{z^2-z+1} \right) =$$

Notes: $T_z^{-1} \left(z^{-1} \frac{1 \cdot z}{z-1} \right) = U(k-1)$
 ↑ retard de 1

$$T_z^{-1} \left(\frac{1 \cdot z}{z \cdot z^2 (z-2)} \right) = T_z^{-1} \left(\frac{z^{-3} \cdot z}{z-2} \right) = z^{k-3} \cdot U(k-3)$$

↑ retard de 3

$$T_z^{-1} \left(\frac{z}{z+3} \right) = (-3)^k \cdot U(k)$$

$$T_z^{-1} \left(\frac{z}{z^2 - z + 1} \right) = \frac{e}{\sqrt{3}} \cdot T_z^{-1} \left(\frac{\frac{\sqrt{3}}{2} z}{z^2 - 2z + 1} \right) = \frac{e}{\sqrt{3}} \cdot \sin\left(k \frac{\pi}{3}\right)$$

$\Rightarrow +1 = +2 \cos \omega \Leftrightarrow \cos \omega = \frac{1}{2} \Leftarrow \omega = \frac{\pi}{3} \Rightarrow \sin \omega = \frac{\sqrt{3}}{2}$

$$T_z^{-1} \left(z^{-1} \frac{1 \cdot z}{z^2 - z + 1} \right) = \frac{e}{\sqrt{3}} \sin\left(\left(k-1\right) \frac{\pi}{3}\right) \cdot U(k-1)$$

↓ retard de 1