Dianatas Santos Brito

matrícula : $2059\,2023\,07 = \frac{26}{10} = 2{,}6 \simeq 3$ } irei usar $N = 3$

$N = 3$

$a = 7$ } $T = \frac{1}{N} = \frac{1}{3} = 0{,}33$ ...

$b = 3$

FT

$$G_p(s) = \frac{N}{s(s^2 + s\sqrt{N} + N)} = \frac{3}{s(s^2 + s\sqrt{3} + 3)}$$

1.1

$$Z\{G(s) \cdot G_p(s)\} = G^*(z) \rightsquigarrow G_z \cdot Z\left\{\frac{1 - e^{-Ts}}{s} \cdot G_p(s)\right\} = (1 - z^{-1}) \cdot Z\left\{\frac{G_p(s)}{s}\right.$$

$$G(s) = \frac{X(z)}{R(z)} = \frac{G^*(z) \cdot D(z)}{1 + G^*(z) \cdot D(z)}$$

\# $$G^*(z) = Z\left\{\frac{3}{s^2(s^2 + s\sqrt{3} + 3)}\right\}$$

↗ Tem que dividir

$$G^*(z) = z(1 - z^{-1})\left\{-\frac{0{,}57666}{s} + \frac{1}{s^2} + \frac{0{,}57666 - 0{,}00263}{s^2 + 1{,}73s + 3}\right\}$$

$$G^*(z) = z(1 - z^{-1})\left\{-\frac{0{,}57666}{s} + \frac{1}{s^2} + \frac{A}{(s + 0{,}865 - j1{,}5)} + \frac{B}{(s + 0{,}865 + j1{,}5)}\right.$$

$$A(s + 0{,}865 + j1{,}5) + B(s + 0{,}865 - j1{,}5) = 0{,}57666s - 0{,}00263$$

$$A(j3) = 0{,}57666(0{,}865 + j1{,}5) - 0{,}00263$$

$$A = 0{,}288 + 0{,}165j \quad \text{?} \quad \text{B é conjugado ... Logo}$$

$$B = 0{,}288 + 0{,}165j$$

Arredondando

$$A = 0{,}29 + 0{,}17j \qquad B = 0{,}29 - 0{,}17j$$

\# $s = -0{,}865 + j$

$$G(z) = (1-z^{-1}) \cdot z \left\{ \frac{-0,57666}{s} + \frac{1}{s^2} + \frac{0,29 + 0,17j}{(s + 0,865 - j1,5)} + \frac{0,29 + 0,17j}{(s + 0,865 + j1,5)} \right\}$$

$$= (1-z^{-1}) \cdot \left[-0,57666 \cdot \frac{1}{1-z^{-1}} + \frac{Tz}{(z-1)^2} + \frac{(0,29 + 0,17j) \cdot z}{z - e^{-(0,865 - j1,5)}} + \frac{(0,29 + 0,17j) \cdot z}{z - e^{-(0,865 + j1,5)}} \right]$$

$T = 0.33s$

$$= -0,57666 + \frac{T}{z-1} + \frac{(0,29 + j0,17)(z-1)}{z - e^{-(0,865 - j1,5)}} + \frac{(0,29 + 0,17j)(z-1)}{z - e^{-(0,865 - j1,5)}}$$

$$G(z) = -0,57666 + \frac{0.33}{z-1} + \frac{(0.29 + j0.17)(z-1)}{z - e^{-(0.28 - j0,495)}} + \frac{(0.29 + j0.17)(z-1)}{z - e^{-(0.28 + j0.495)}}$$

Resultado obtido pelo matlab em anexo

3.1

considerando as condições iniciais nulas

$$\frac{Y(z)}{U(z)} = \frac{z(z+1)}{z^2 - \frac{1}{3}z + \frac{1}{7}}$$

$$\downarrow$$

$$\frac{z}{z-1}$$

$$Y(z) = \frac{z^2(z-1)}{(z-1)(z^2 - \frac{1}{3}z + \frac{1}{7})} = \frac{A}{z-1} + \frac{B}{(z - 0.165 + j0.33)} + \frac{B^*}{(z - 0.165 + j0.33)}$$

$$\Rightarrow A(z - 0.165 + j0.33)(z - 0.165 - j0.33) + B(z-1)(z - 0.165 + j0.33) + B^*(z-1)(z-0,165 + j0.33) = z^2(z+1)$$

com $z = 1$

$$A(-0.165 + j0.33)(-0.165 - j0.33) = 1(1+1)$$

$$A(0.136125) = 2 \Rightarrow A = 14,7$$

com $z = 0.165 - j0.33$

$$B(0.165 - j0.33)(-j0.66) = -0.13 - j0.99$$

$$B = \frac{-0.13 - j0.99}{}$$