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Disciplina: Modelagem de Sistemas Dinâmicos

Exercícios - 03/11/2020

1) $Y = (I + GH^{-1})GR \Rightarrow T = (GH + I)^{-1}G$
$Y = TR$

Em uma analise por diagrama de blocos tem-se que:

$\rightarrow Z = HY \rightarrow R - E = HY \rightarrow R - G^{-1}Y = HY \rightarrow$
$\rightarrow R = (G^{-1} + H)Y$

- Portanto tem-se que:

$R = (I + HG)G^{-1}Y \rightarrow (I + HG)^{-1}R = G^{-1}Y$
$\Rightarrow Y = G(I + HG)^{-1}R$

- Logo verifica-se que $T = G(I + HG)^{-1}$ e:

$G(I + HG)^{-1} = (I + GH)^{-1}G = G(I + L)^{-1}$

- Sendo portanto: $L \equiv HG$

2) $Z = HY = HGE = HG(R-Z)$

$$Z = \frac{HGR}{(I+GH)}$$

- $ZR^{-1} = (1+HG)^{-1}HG$

$$Y = GE$$
$$H^{-1}Z = G(R-Z)$$
$$(H^{-1}+G)Z = GR$$
$$(I+GH)H^{-1}Z = GR$$

- $Z = H(I+GH)^{-1}GR$

Paro escalonar bosto fozer que: $HG = GH = L$
na qual $\frac{Z}{R} = \frac{GH}{(I+GH)} = \frac{L}{I+L}$

3) $Y = GH \cdot C \rightarrow Y = GH \cdot (A-Y)$

$$Y = GHR \cdot YH - GHY$$
$$Y(1+GH) = GR$$

- $\frac{Y}{R} = \frac{G}{1+GH}$

$$Y = GE$$
$$Y = G(R-Z)$$
$$Y = G(R-YH)$$
$$Y(1+HG) = GR$$

- $\frac{Y}{R} = \frac{G}{1+GH}$

4) $y = \frac{G}{1+G(H-1)} \cdot (R-y) = y\left(1 + \frac{G}{1+G(H-1)}\right)$

$Y = \frac{GR}{1+G(H-1)}$ $\boxed{\frac{Y}{R} = \frac{G}{1+GH}}$

5) $G[(R-Y)-(H-1)Y] = Y$

$G(R-HY) = Y$

$GR - GHY = Y$

$Y(1+GH) = GR$

- $\frac{Y}{R} = \frac{G}{1+GH}$

6) $Y = G(R-(H-1)Y-Y)$

$Y = G(R-H)$

- $Y = \frac{G}{HG+1} \cdot R$

7) $G_1G_2(R-Y_1) = Y_1$

$G_1G_2R - G_1G_2Y_1 = Y_1$

- $Y_1 = \frac{G_1G_2R}{1+G_1G_2}$

8) $G_2(D-G_1Y_2) = Y_2$

$G_2D - G_2G_1Y_2 = Y_2$

$G_2D = Y_2 + G_2G_1Y_2$

$Y_2 = \frac{G_2D}{1+G_1G_2}$

9) $G_2(G_1(R-Y)+D) = Y$

$G_2G_1R - G_2G_1Y + G_2D = Y$

$Y = \frac{G_2G_1R}{1+G_1G_2} + \frac{G_2D}{1+G_1G_2}$

- $Y = Y_1 + Y_2$ (visto do ex 7 e 8)

10) $Z = W \pm X \pm Y \equiv Z = W + (\pm Y \pm X)$

11) $\left(G_2[G_1(RH_3Y)] - \frac{H_2Y}{G_4}\right) \cdot \frac{G_3G_4}{1-G_3G_4H_1} = Y$

Portanto temos que:

$\frac{Y}{R} = G_1G_2G_3G_4 \cdot \frac{1}{(1-G_3G_4H_1 + G_2G_3H_2 + G_1G_2G_3G_4)}$

12) $T = \frac{G_1 \cdot G_2 \cdot G_3 \cdot G_4}{1-G_3G_4H_1 + G_2G_3H_2}$

$AT = Y \qquad B = YH_3$

$A = R - B = R - YH_3$

$\frac{Y}{T} = R - YH_3$

$Y \cdot \left(\frac{1}{T} + H_3\right) = R$

- $\frac{Y}{R} = \frac{T}{1+TH_3}$

13) $\frac{Y}{R} = \frac{G_1G_2G_3G_4}{-G_3G_4H_1 + G_2G_3H_2 + G_1G_2G_3G_4H_2}$