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Problema # 4

$\frac{23}{25}$

Calcular función característica

$$\frac{1}{5}\frac{d^2x}{dt^2}+\frac{2}{5}\frac{dx}{dt}+x=y+2\frac{dy}{dt}$$ clase PDT_2

Por superposición $h(t)=h_1(t)+h_2(t)$

NO USES FLECHAS

PT_2

$$\frac{1}{5}\frac{d^2x}{dt^2}+\frac{2}{5}\frac{dx}{dt}+x=y \qquad K=1$$

$$T^2=\frac{1}{5} \rightarrow T=0.4472$$

$$2DT=\frac{2}{5} \rightarrow D=\frac{2}{2(5)(T)}=0.4472$$

$$D^2=(0.4472)^2=0.19998\approx 0.2$$

Cuando $D^2<1$

$$a=-\frac{D}{T}=\frac{-0.4472}{0.4472}=-1$$

$$b=\frac{\sqrt{1-D^2}}{T}=\frac{\sqrt{1-0.2}}{0.4472}=2$$

soluciones

$P_1=-1-j2$

$P_2=-1-j2$

a) 13

$$h_1(t)=1-\sqrt{1+\left(\frac{-1}{2}\right)^2}\,e^{-t}\cos\left(2t+\tan^{-1}\left(\frac{-1}{2}\right)\right)$$

$$h_1(t)=1-1.118\,e^{-t}\cos(2t-26.57°)$$

b) T_2 10

$$\frac{1}{5}\frac{d^2x}{dt^2}+\frac{2}{5}\frac{dx}{dt}+x=\frac{2dy}{dt} \quad // \int(\,)$$ $K=2$

$$\frac{1}{5}\frac{dx}{dt}+\frac{2}{5}x+\int_0^t x(\tau)\,d\tau=2y$$ $$v=\int_0^t x(\tau)\,d\tau$$

$$\frac{1}{5}\frac{d^2v}{dt^2}+\frac{2}{5}\frac{dv}{dt}+v=2y$$ $$x=\frac{dv}{dt}$$

$$\frac{dx}{dt}=\frac{d^2v}{dt^2}$$

clase PT_2

Escriba correctamente

Por $h_1(t)$ sabemos que.

$$v(t)=2\left[1-1.118e^{-t}\cos(2t-26.57°)\right]$$ ✓

$$x(t)=\frac{dv}{dt}$$

$$=2-2.236e^{-t}\cos(2t-26.57) \quad // \frac{d}{dt}$$

$h_2(t)=$

$$-\left(-2.2336e^{-t}\cos(2t-26.57)-2.236e^{-t}\sin(2t-26.57)(2)\right)$$

$$=2.236e^{-t}\cos(2t-26.57)+4.472e^{-t}\sin(2t-26.57)$$

$$h_2(t)=2.236e^{-t}\cos(2t-26.57)+4.472e^{-t}\sin(2t-26.57)$$

Por superposición $h(t)=h_1(t)+h_2(t)$

$$h(t)=1-1.118e^{-t}\cos(2t-26.57°)+2.236e^{-t}\cos(2t-26.57°)$$
$$+4.472e^{-t}\sin(2t-26.57°)$$