

$$\begin{cases} \ddot{y} = -2y + z \\ \ddot{z} = y - z \end{cases} \Rightarrow \begin{cases} z = \ddot{y} + 2y \\ \ddot{z} = y - z \end{cases} \Rightarrow \begin{cases} \dot{z} = \ddot{y} + 2\dot{y} \\ \ddot{z} = y - z \end{cases} \Rightarrow \begin{cases} \dot{z} = \mathbf{y^{(4)}} + 2\dot{y} \\ \ddot{z} = y - z \end{cases}$$

$$\begin{cases} \ddot{y} = -2y + z \\ \ddot{z} = y - z \end{cases} \Rightarrow \ddot{y} + \ddot{z} = -y \Rightarrow \ddot{y} + \mathbf{y^{(4)}} + 2\ddot{y} = -y$$

[illegible]

המשוואה האופיינית:

$$\lambda^4 + 3\lambda^2 + 1 = 0 \quad \Rightarrow \quad t_{1,2} = \frac{-3 \pm \sqrt{5}}{2} \quad \Rightarrow \quad \lambda_{1,2,3,4} = \pm \sqrt{\frac{3 \pm \sqrt{5}}{2}} i$$

$$\lambda_{1,2} = 0 \pm 1.618i \quad , \quad \lambda_{3,4} = 0 \pm 0.618i$$

$$y = C_1 \cos 0.618x + C_2 \sin 0.618x + C_3 \cos 1.618x + C_4 \sin 1.618x$$

$$\dot{y} = -0.618C_1 \sin 0.618x + 0.618C_2 \cos 0.618x - 1.618C_3 \sin 1.618x + 1.618C_4 \cos 1.618x$$

$$\ddot{y} = -0.382C_1 \cos 0.618x - 0.382C_2 \sin 0.618x - 2.618C_3 \cos 1.618x - 2.618C_4 \sin 1.618x$$

$$z = \ddot{y} + 2y$$

$$z = -0.382C_1 \cos 0.618x - 0.382C_2 \sin 0.618x - 2.618C_3 \cos 1.618x - 2.618C_4 \sin 1.618x$$

$$+2C_1 \cos 0.618x + 2C_2 \sin 0.618x + 2C_3 \cos 1.618x + 2C_4 \sin 1.618x$$

$$z = 1.618C_1 \cos 0.618x + 1.618C_2 \sin 0.618x - 0.618C_3 \cos 1.618x - 0.618C_4 \sin 1.618x$$

$$(y = C_1 \cos 0.618x + C_2 \sin 0.618x + C_3 \cos 1.618x + C_4 \sin 1.618x$$

$$\{z = 1.618C_1 \cos 0.618x + 1.618C_2 \sin 0.618x - 0.618C_3 \cos 1.618x - 0.618C_4 \sin 1.618x$$