

1.- Linealizar el sistema  $z = xy + y^3 + \sin(x) + 9$ , que opera normalmente en el rango  $-4 < x < 4$ ,  $-1 < y < 0,5$ .

$$\text{Establecemos } \bar{x} = \frac{4+(-4)}{2} = 0, \bar{y} = \frac{0,5+(-1)}{2} = -0,25$$

$$\text{y } \bar{z} = z(\bar{x}, \bar{y}) = 0 \cdot (-0,25) + (-0,25)^3 + \sin(0) + 9 = 8,984375.$$

Hallamos  $K_1$  y  $K_2$ :

$$-K_1 = \left. \frac{\partial z}{\partial x} \right|_{\bar{x}, \bar{y}} = y + \cos(x) = (-0,25) + \cos(0) = 0,75.$$

$$-K_2 = \left. \frac{\partial z}{\partial y} \right|_{\bar{x}, \bar{y}} = x + 3y^2 = (0) + 3(-0,25)^2 = 0,1875.$$

Por último, calculamos  $z_{\text{linealizada}}$ :

$$\begin{aligned} z_e &= \bar{z} + K_1(x - \bar{x}) + K_2(y - \bar{y}) = \\ &= 8,984375 + 0,75(x - 0) + 0,1875(y - (-0,25)) = \\ &= 8,984375 + 0,75x + 0,1875y + 0,046875 = \\ &= \underline{\underline{0,75x + 0,1875y + 9,03125}} \end{aligned}$$