4 Modelo para controle da altitude

Modelo não linearizado

$$\ddot{\theta}_4 = \frac{1}{((Ix_4 - Iy_4)c(\theta_1)^2 + Iy_4)}(-c(\theta_1)s(\theta_1)(Ix_4 - Iy_4)\ddot{\theta}_2 - c(\theta_1)s(\theta_1)(Ix_4 - Iy_4)\ddot{\theta}_3 - \dot{\theta}_1(-(Ix_4 - Iy_4)s(\theta_1)^2 + (Ix_4 - Iy_4)c(\theta_1)^2)\dot{\theta}_2 - \dot{\theta}_1(-(Ix_4 - Iy_4)s(\theta_1)^2 + (Ix_4 - Iy_4)c(\theta_1)^2)\dot{\theta}_3 + 2\dot{\theta}_1 c(\theta_1)s(\theta_1)(Ix_4 - Iy_4)\dot{\theta}_4 + \tau_z) \quad (4.1)$$

Modelo Linearizado

$$\dot{\theta}_4 = \frac{\tau_z}{Ix_4} \quad (4.2)$$

Vetor de Estado

$$x = \begin{bmatrix} \theta_4 & \dot{\theta}_4 \end{bmatrix}^T \quad (4.3)$$

Vetor de Comando

$$u = \begin{bmatrix} f_x & f_y & \tau_z \end{bmatrix}^T \quad (4.4)$$

Matrizes A e B

$$A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \quad (4.5)$$

$$B = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & \frac{1}{Ix_4} \end{bmatrix} \quad (4.6)$$