$$\begin{bmatrix} \dot{\phi} \\ \dot{p} \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -k_\phi/I_x & -k_p/I_x \end{bmatrix} \qquad \begin{bmatrix} \dot{\theta} \\ \dot{q} \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -k_\theta/I_y & -k_q/I_y \end{bmatrix}$$

$k_p = -(\lambda_1 + \lambda_2) I_x \quad K_\phi = \lambda_1 \lambda_2 I_x$ $\qquad k_r = 0.004$ from 2.3

$k_q = -(\lambda_1 + \lambda_2) I_y \quad K_\theta = \lambda_1 \lambda_2 I_y$

$\lambda_1 = -1/\tau \rightarrow \tau = 0.5, \lambda_1 = -2$

$\lambda_2 < \lambda_1$ so λ_1 dominates, ex: $\lambda_2 = -10$

for $\lambda_1 = -2$, $\lambda_2 = -10$, $I_x = 5.8 \cdot 10^{-5}\ kg \cdot m^2$, $I_y = 7.2 \cdot 10^{-5}\ kg \cdot m^2$

$K_p = 0.000696 \quad K_\phi = 0.00116 \quad K_q = 0.000864 \quad K_\theta = 0.00144$

$(k_{1x}) \quad (k_{2x}) \quad (k_{1y}) \quad (k_{2y})$

$L = -k_\phi \phi - k_p p \quad M = -k_\theta \theta - k_q q \quad N = -k_r r$

$L = -0.00116\phi - 0.000696p$

$M = -0.00144\theta - 0.000864q$

$N = -0.004r$