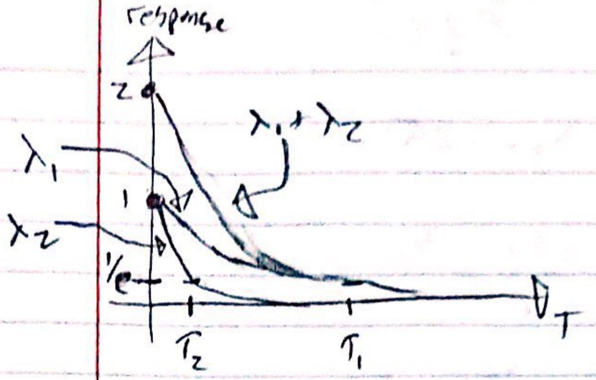
$\boxed{\text{lateral}}$ $\lambda^2 + \frac{k_1}{I_x}\lambda + \frac{k_2}{I_x} = 0$



λ_1 is dominant

$T_1 < 0.5$ sec

$e^{-1} = e^{\lambda T} \Rightarrow -1 = \lambda T \Rightarrow -1 = \lambda_1 T_1$

$-1 > \lambda_1 (0.5) \Rightarrow \lambda_1 < -2$

$\boxed{\lambda_1 = -2.5}$

for λ_1 to be very dominant, $\lambda_2 << \lambda_1$

$\boxed{\lambda_2 = -25}$

plug into characteristic eqn.

$6.25 - \frac{2.5 k_1}{I_x} + \frac{k_2}{I_x} = 0 \qquad 625 - \frac{25 k_1}{I_x} + \frac{k_2}{I_x} = 0$

$I_x = 5.8 * 10^{-5}$

Solve for k_1 and k_2

$\boxed{k_1 = 1.6 * 10^{-3} \qquad k_2 = 3.62 * 10^{-3}}$

longitudinal is same except $\lambda^2 + \frac{k_3}{I_y}\lambda + \frac{k_4}{I_y} = 0$

$\therefore \frac{k_1}{I_x} = \frac{k_3}{I_y}$ and $\frac{k_2}{I_x} = \frac{k_4}{I_y}$

$I_y = 7.2 * 10^{-5}$

$\boxed{k_3 = 1.99 * 10^{-3} \qquad k_4 = 4.49 * 10^{-3}}$