

Roll support

(Q3) $T(2/1) = \frac{1}{2} C_2 \cdot \dot{\varphi}^2$; $\dot{\theta} = -\dot{\varphi} \frac{L}{R}$

(Q4) $T(3/1) = \frac{1}{2} m_3 \vec{v}(CE^{3/1})^2 + \frac{1}{2} \vec{\Omega}^{3/1} \cdot \vec{V}(CE^{3/1})$

$$\vec{V}(CE^{3/1}) = \begin{bmatrix} A_3 \\ B_3 \\ B_3 \end{bmatrix} \begin{bmatrix} \dot{\varphi} \frac{L}{R} \\ 0 \\ \dot{\varphi} \end{bmatrix} = -\dot{\varphi} \frac{L}{R} A_3 \vec{x}_2 + \dot{\varphi} B_3 \vec{y}_2$$

$$\vec{\Omega}^{3/1} = -\dot{\varphi} \frac{L}{R} \vec{z}_2 + \dot{\varphi} \vec{y}_2 ; \vec{V}(CE^{3/1}) = L \dot{\varphi} \vec{y}_2$$

$$\Rightarrow T(3/1) = \frac{1}{2} m_3 L^2 \dot{\varphi}^2 + \frac{1}{2} \dot{\varphi}^2 \left(\frac{L^2}{R^2} A_3^2 + B_3^2 \right)$$

$$T(3/1) = \frac{1}{2} \dot{\varphi}^2 \left[m_3 L^2 + B_3 + A_3 \frac{L^2}{R^2} \right]$$

(Q5) Principe : $P_{ext} = C_m \dot{\varphi}$

(Q6) $T(3+2/1) = \dots$

$$\frac{dT(3+2/1)}{dt} = P \Rightarrow$$

$$C_2 \dot{\varphi} \ddot{\varphi} + \dot{\varphi} \ddot{\varphi} \left[m_3 L^2 + B_3 + A_3 \frac{L^2}{R^2} \right] = C_m \dot{\varphi}$$

(Q7) $C_T = C_2 + m_3 L^2 + B_3 + A_3 \frac{L^2}{R^2}$