Combined Loop Eq.'s

Friday, March 31, 2017 10:18 PM

Accelerations: Unknowns: l_{AC}'', α_4, α_5, R_x''

(1) $l_{AC}''[\cos\theta_4] + \alpha_4[l_{AC}(-\sin\theta_4)] + \alpha_5[0] + R_x''[+1] =$

$$-l_{A_0A}\,\omega_2^2(-\cos\theta_2) + \underbrace{l_{AC}'\omega_4(\sin\theta_4) + l_{AC}'\omega_4(\sin\theta_4)}_{2\,l_{AC}'\omega_4(\sin\theta_4)} + l_{AC}\,\omega_4^2(\cos\theta_4)$$

(2) $l_{AC}''[\sin\theta_4] + \alpha_4[l_{AC}\cos\theta_4] + \alpha_5[0] + R_x''[0] =$

$$-l_{A_0A}\,\omega_2^2(-\sin\theta_2) - \underbrace{l_{AC}'\omega_4(\cos\theta_4) - l_{AC}'\omega_4(\cos\theta_4)}_{-2\,l_{AC}'\omega_4(\cos\theta_4)} - l_{AC}\,\omega_4^2(-\sin\theta_4)$$

(3) $l_{AC}''[0] + \alpha_4[-R_4\sin\theta_4] + \alpha_5[-R_5\sin\theta_5] + R_x''[+1] =$

$$\omega_5^2 R_5\cos\theta_5 + \omega_4^2 R_4\cos\theta_4$$

(4) $l_{AC}''[0] + \alpha_4[R_4\cos\theta_4] + \alpha_5[R_5\cos\theta_5] + R_x''[0] =$

$$\omega_5^2 R_5\sin\theta_5 + \omega_4^2 R_4\sin\theta_4$$

Position, Velocity, & Acceleration's of C.O.M's

Point A

$$\vec{r}_A = \begin{cases} r_{Ax}: \overline{A_0A}\cos\theta_2 \\ r_{Ay}: \overline{A_0A}\sin\theta_2 \end{cases}$$

$$\vec{V}_A = \begin{cases} V_{Ax}: -\overline{A_0A}\sin\theta_2(\omega_2) \\ V_{Ay}: \overline{A_0A}\cos\theta_2(\omega_2) \end{cases}$$

$$\vec{a}_A = \begin{cases} a_{Ax}: -\overline{A_0A}\,\omega_2^2\cos\theta_2 \\ a_{Ay}: -\omega_2^2\sin\theta_2 \end{cases}$$

ELEMENT 2:

$$\vec{r}_{cm,2} \begin{cases} r_{cm_2,Ax}: \frac{\overline{A_0A}}{2}\cos\theta_2 \\ r_{cm_2,Ay}: \frac{\overline{A_0A}}{2}\sin\theta_2 \end{cases}$$

$$\vec{V}_{cm,2} \begin{cases} V_{cm_2,Ax}: -\frac{\overline{A_0A}}{2}\sin\theta_2\cdot\omega_2 \\ V_{cm_2,Ay}: \frac{\overline{A_0A}}{2}\cos\theta_2\cdot\omega_2 \end{cases}$$

$$\vec{a}_{cm_2} \begin{cases} a_{cm_2,x}: -\frac{\overline{A_0A}}{2}\omega_2^2\cos\theta_2 \\ a_{cm_2,y}: \frac{\overline{A_0A}}{2}\omega_2^2\sin\theta_2 \end{cases}$$