

$$\alpha := 1.38 \text{ rad} \quad \beta := 0.21 \text{ rad} \quad l_1 := 0.99 \text{ m} \quad \omega := 8.01 \frac{\text{rad}}{\text{s}}$$

$$\alpha_P := 9.44 \frac{\text{rad}}{\text{s}} \quad \beta_P := 0 \frac{\text{rad}}{\text{s}} \quad l_2 := 0.61 \text{ m}$$

$$\alpha_{PP} := 1.75 \frac{\text{rad}}{\text{s}^2} \quad \beta_{PP} := 0 \frac{\text{rad}}{\text{s}^2}$$

$${}_1A_2 := \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos(\alpha) & -\sin(\alpha) \\ 0 & \sin(\alpha) & \cos(\alpha) \end{bmatrix}$$

$${}_2A_1 := {}_1A_2^{-1}$$

$${}_2A_3 := \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos(\beta) & \sin(\beta) \\ 0 & -\sin(\beta) & \cos(\beta) \end{bmatrix}$$

$${}_3A_2 := {}_2A_3^{-1}$$

$${}_1A_3 := {}_1A_2 \cdot {}_2A_3$$

$${}_3A_1 := {}_1A_3^{-1}$$

$${}_2r_{OA} := \begin{bmatrix} 0 \\ l_1 \\ 0 \end{bmatrix}$$

$${}_3r_{AP} := \begin{bmatrix} 0 \\ l_2 \\ 0 \end{bmatrix}$$

$${}_3r_{OA} := {}_3A_2 \cdot {}_2r_{OA}$$

$${}_1\omega_{12} := \begin{bmatrix} 0 \\ 0 \\ \omega \end{bmatrix} \quad {}_2\omega_{12} := \begin{bmatrix} \alpha_P \\ 0 \\ 0 \end{bmatrix} \quad {}_3\omega_{23} := \begin{bmatrix} \beta_P \\ 0 \\ 0 \end{bmatrix}$$

$${}_3r_{OP} := {}_3r_{OA} + {}_3r_{AP} = \begin{bmatrix} 0 \\ 1.578 \\ 0.206 \end{bmatrix} \text{ m}$$

$${}_3\omega := {}_3A_1 \cdot {}_1\omega_{12} + {}_3A_2 \cdot {}_2\omega_{12} + {}_3\omega_{23}$$

$$v_P := {}_3\omega \times {}_3r_{OP}$$

$$v_{P_abs} := |v_P| = 15.408 \frac{\text{m}}{\text{s}}$$

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