Example – Velocity Diagram

Given: \( \omega_2 = 1 \text{ rad/s} \)
Find: \( \mathbf{v}_F \)

1. Put an observer at \( A \) attached to link 3

\[
\mathbf{v}_C = \mathbf{v}_A + \mathbf{v}_{C/A} + \omega_3 \times \mathbf{r}_{C/A}
\]

\[
\omega_3 = \left| \frac{\omega_2 \times \mathbf{r}_{C/A}}{\mathbf{r}_{C/A}} \right| = \frac{1.5}{4} = 0.375
\]

2. We can now find the velocity of \( B \)

\[
\mathbf{v}_B = \mathbf{v}_A + \mathbf{v}_{B/A} + \omega_3 \times \mathbf{r}_{B/A}
\]

\[
\left| \omega_3 \times \mathbf{r}_{C/A} \right| = (0.375)(1.75) = 0.6563
\]
3. Put an observer at $B$ attached to link 5

$$v_D = v_B + v_{D/B} + \omega_5 \times r_{D/B}$$

4. Find the velocity of $E$

$$v_E = \frac{EO}{DO_0} \cdot v_D = \frac{(6)(0.2)}{4} = 0.3 \text{ in/s}$$

5. Put an observer at $E$ attached to link 7

$$v_F = v_E + v_{E/E} + \omega_7 \times r_{F/E}$$

$$v_F = 0.22 \text{ in/s}$$