Velocity Analysis of a Four-bar Mechanism

Find $\bar{V}_A$

$$|\bar{V}_A| = a \omega_2$$

Form vector triangle $\bar{V}_B = \bar{V}_A + \bar{V}_{BA}$

Direction of $\bar{V}_B$: $pp \perp O_4B$

Direction of $\bar{V}_{BA}$: $qq \perp AB$

$\bar{V}_B$ along $pp$ at tail of $\bar{V}_A$

$\bar{V}_{BA}$ along $pp$ at tip of $\bar{V}_A$ (transfer the parallel line)

Tips of $\bar{V}_{BA}$ and $\bar{V}_B$ meet.

Find Angular Velocities

$$|\omega_3| = \frac{|\bar{V}_{BA}|}{AB}$$

$$|\omega_4| = \frac{|\bar{V}_B|}{O_{4B}}$$

Two ways to find $\bar{V}_{CA}$

$$|\bar{V}_{CA}| = |\omega_3|AC \quad \text{or}$$

By Similar Triangles

Find the velocities of a coupler point C

$$\bar{V}_C = \bar{V}_A + \bar{V}_{CA}$$