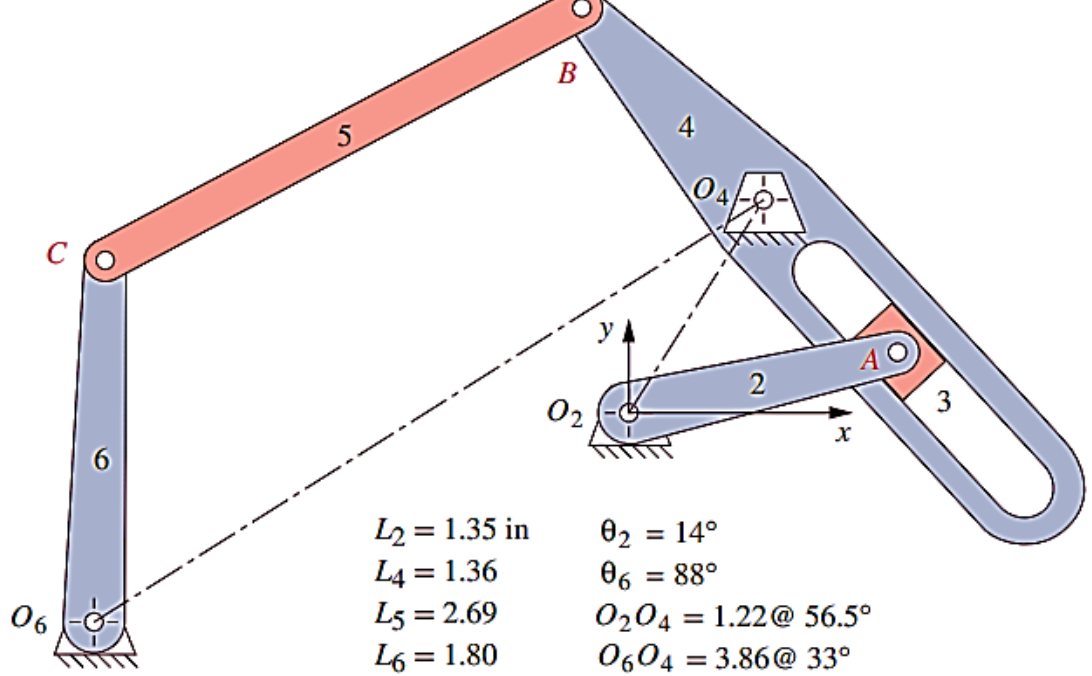
Homework No. 1 Vector Loop Closure Equation

Your solution for each problem should include the following

1. What's given in the problem (FBD and numerical values)
2. What's required
3. Solution
4. Comments, recommendations.
5. You should use cover page with your name and your serial no.

Due Monday 10/04/2023 (lecture time).

P1. Use vector LCE method to calculate the accelerations of points A, B, and C for the position shown. Problems 6-64 and 7-52 in the text book.

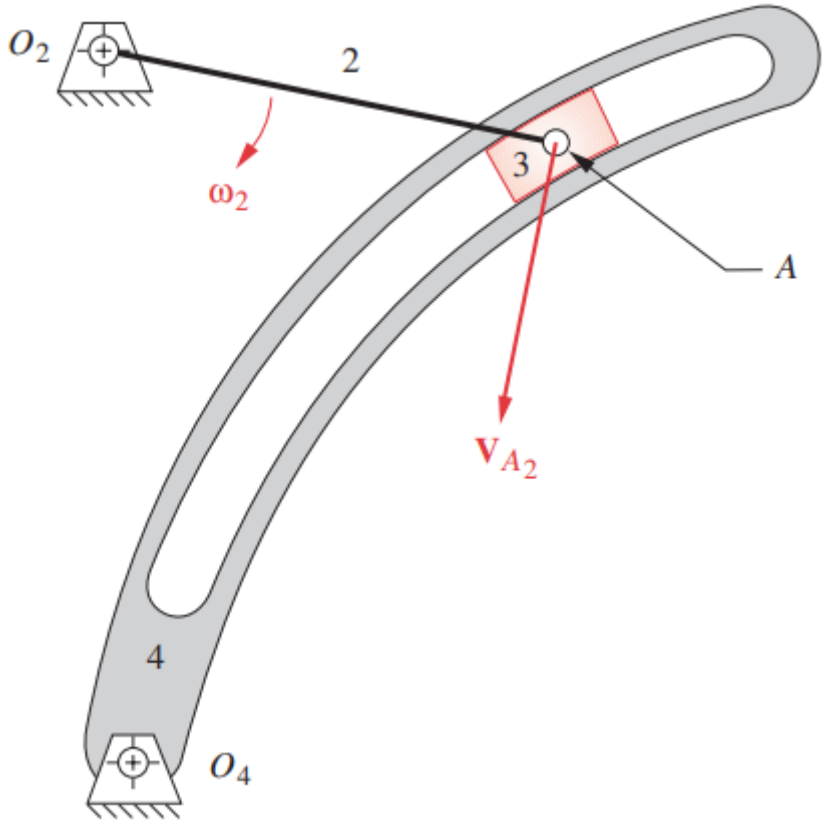


Given: Link lengths and angles:

Link 1 (O_2O_4)	$d := 1.22 \cdot in$	Angle O_2O_4 makes with X axis	$\theta_1 := 56.5 \cdot deg$
Link 2 (O_2A)	$a := 1.35 \cdot in$	Angle O_2A makes with X axis	$\theta_2 := 14 \cdot deg$
Link 4 (O_4B)	$e := 1.36 \cdot in$		
Link 5 (BC)	$f := 2.69 \cdot in$		
Link 6 (CO_6)	$g := 1.80 \cdot in$	Angle CO_6 makes with X axis	$\theta_6 := 88 \cdot deg$

Motion of link 2 $\omega_2 := 20 \cdot rad \cdot sec^{-1}$ CW $\alpha_2 := 0 \cdot rad \cdot sec^{-2}$

P2. Figure shows an inverted slider-crank mechanism. Given the dimensions below, use vector LCE method to find the acceleration of point A. Problem 6-61 in the text book.



Link lengths:

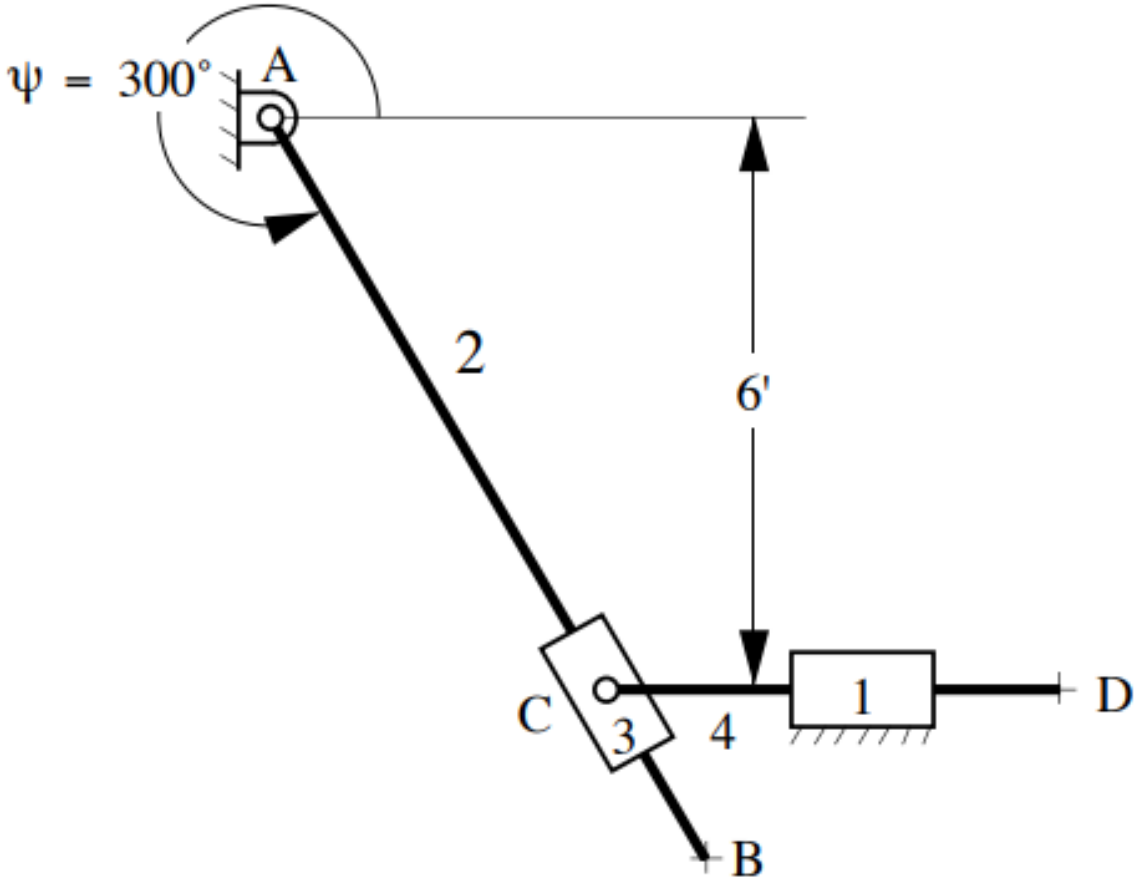
Link 2 (O_2A) $a := 2.5 \cdot in$ Link 4 (O_4A) $c := 4.1 \cdot in$ Link 1 (O_2O_4) $d := 3.9 \cdot in$

Measured angles:

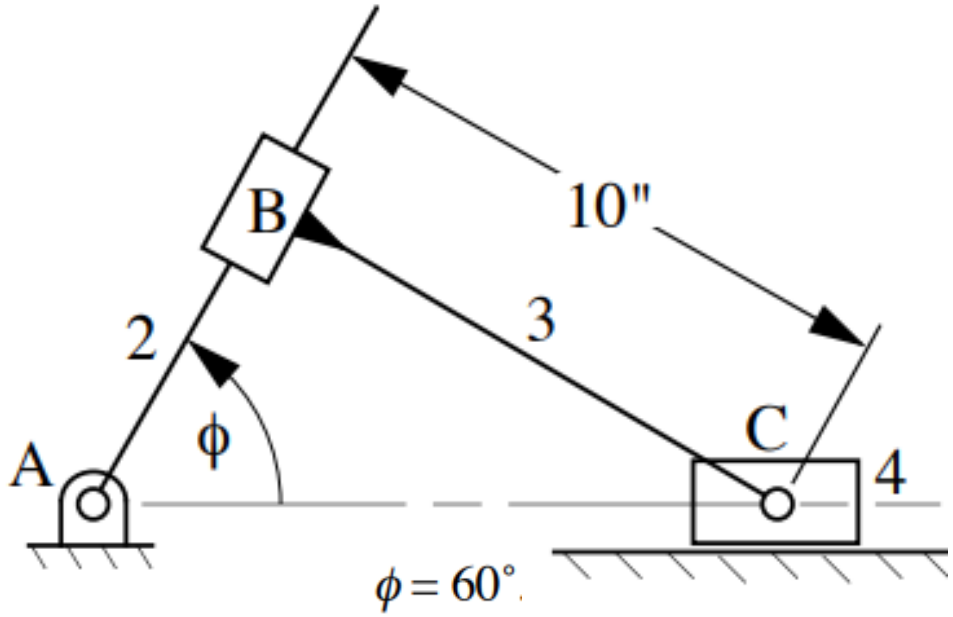
$\theta_2 := 75.5 \cdot deg$ $\theta_{trans} := 26.5 \cdot deg$ $\theta_{slip} := 116.5 \cdot deg$

Velocity of point A on links 2 and 3: $V_{A2} := 20 \cdot in \cdot sec^{-1}$ $V_{A3} := V_{A2}$

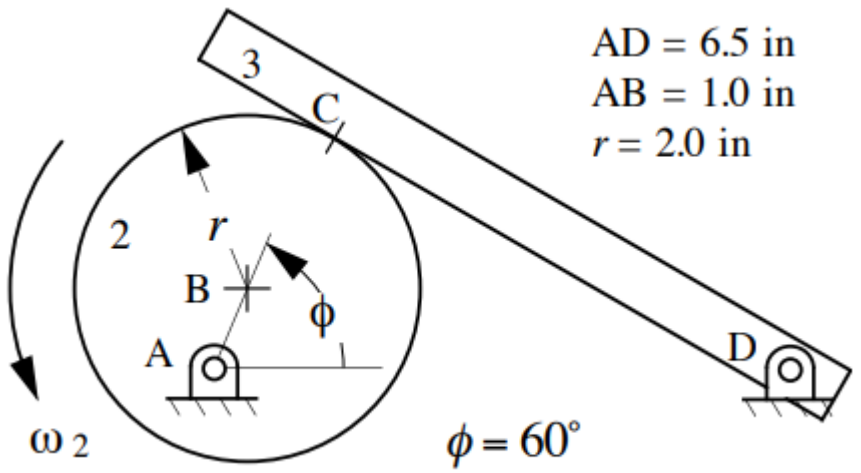
P3. For the mechanism shown, the velocity of rod CD is a constant 10 in/min to the right, use the loop closure equation to determine the angular acceleration of link 2.



P5. In the mechanism shown, link 3 is perpendicular to link 2. Use the loop closure equation to find the acceleration of point C. The angular velocity of link 2 is constant and equal 100 rad/s CCW.



P4. For the mechanism shown, link 2 rotates with an angular velocity of 200 rad/s. use the loop closure equation to determine the angular velocity and acceleration of link 3. link 3 is of negligible thickness, treat it as line.



the cam (link 2)
follower (link 3)