

Elementary Dynamics Example #34a: (Rigid Body Kinematics – Instantaneous Centers)

Given: ω_{OA}

- two special configurations of the slider-crank mechanism

Find: ω_{AB}

Solution:

In the first configuration, the velocities of A and B are parallel – both directly left for a counterclockwise ω_{OA} . Lines drawn through A and B that are perpendicular to the velocities are also parallel and, hence, do not intersect. Link AB is in purely translational motion at this instant, so $\omega_{AB} = 0$.

In the second configuration (shown below), because the slider is at its maximum displacement, the velocity of B is zero. So, B is the IC for link AB at this instant. Recognizing this, the velocity of A can be written as

$$v_A = R\omega_{OA} = L\omega_{AB} \Rightarrow \omega_{AB} = \left(\frac{R}{L}\right)\omega_{OA}$$

