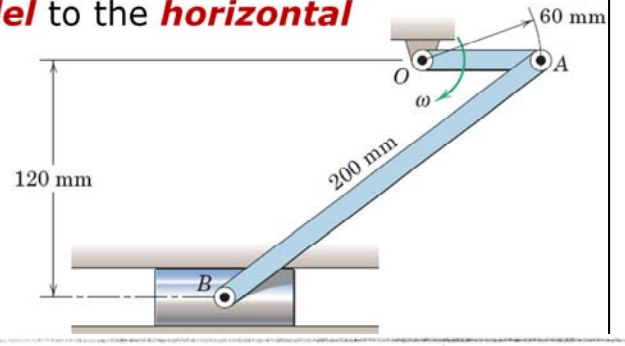
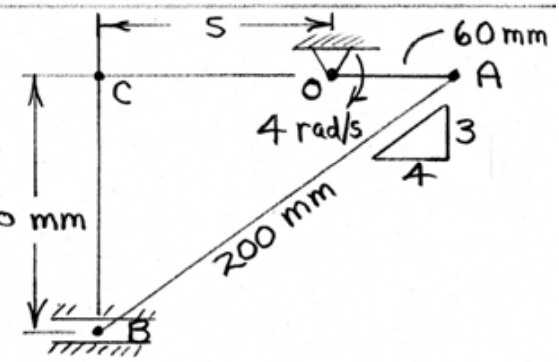
Solution of Relative-Acceleration Eq.: Exercise

Link ***OA*** has constant ***angular velocity*** $\omega = 4$ rad/s.

Determine the ***angular acceleration*** α_{AB} of link ***AB*** when ***OA*** is ***parallel*** to the ***horizontal axis*** through ***B***.



5/149



$(60+s)^2 + 120^2 = 200^2$

$s = 100$ mm

$v_A = 0.06(4) = 0.24$ m/s

$\omega_{AB} = \frac{v_A}{\overline{AC}} = \frac{0.24}{0.160}$

$= 1.5$ rad/s

$\underline{a}_B = \underline{a}_A + (\underline{a}_{B/A})_n + (\underline{a}_{B/A})_t$; $a_A = (a_A)_n = 0.06(4)^2$

$= 0.96 \frac{m}{s^2} \leftarrow$

$(a_{B/A})_n = 0.2(1.5)^2$

$= 0.45$ m/s^2 $\angle 45°$

From the diagram,

$(a_{B/A})_t = \frac{3}{4}(0.45) = 0.338 \frac{m}{s^2}$

$\alpha_{AB} = (a_{B/A})_t / \overline{AB}$

$= \frac{0.338}{0.2} = \underline{1.688 \text{ rad/s}^2 \text{ CCW}}$