dynamics explanation

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1   question d

the velocity of point b is defined as $\vec{V_A} = \vec{V_O} + \omega \times r_{\vec{A/O}}$ Since

$$v_O = 0 \tag{1}$$

by using the cross-product we can find that

$$\vec{V_A} = \omega * r_{\vec{b/a}} = [0, 0, -4]^T \times [-\sqrt{3}/2, -1, 0]^T = [-4, 2\sqrt{3}, 0]^T \tag{2}$$

$$\vec{V_b} = \vec{V_A} + \omega_{AB} \times r_{\vec{B/A}} \tag{3}$$

$$\vec{V_b} = [(\omega_{AB}\sqrt{2}/2) - 4, (-\omega_{AB}\sqrt{2}/2) + 2\sqrt{3}, 0]^T \tag{4}$$

Since $\vec{V_b}x = 0$

$$0 = (\omega_{AB}\sqrt{2}/2) - 4 \tag{5}$$

$$\omega_{AB} = 4\sqrt{2} \tag{6}$$