PROB. 14-22

$v_{AO} = 12 \frac{ft}{s}$, $v_C = 6.29 \frac{ft}{s}$, FIND v_A AND v_B

$m_A \vec{v}_{AO} = m_A \vec{v}_A + m_B \vec{v}_B + m_C \vec{v}_C$

$\vec{v}_{AO} = \vec{v}_A + \vec{v}_B + \vec{v}_C$

$\vec{v}_{AO} = (12 \cdot \cos 30^\circ)\hat{i} + (12 \cdot \sin 30^\circ) = (10.39)\hat{i} + (6)\hat{j} \frac{ft}{s}$

$\vec{v}_A = (v_A \cdot \sin 7.4)\hat{i} + (v_A \cdot \cos 7.4)\hat{j}$

$\vec{v}_A = (0.1288 v_A)\hat{i} + (0.9917 v_A)\hat{j} \frac{ft}{s}$

$\vec{v}_B = (v_B \cdot \sin 49.3^\circ)\hat{i} + (-v_B \cdot \cos 49.3^\circ)\hat{j}$

$\vec{v}_B = (0.7581 v_B)\hat{i} + (-0.6521 v_B)\hat{j} \frac{ft}{s}$

$\vec{v}_C = (6.29 \cdot \cos 45)\hat{i} + (6.29 \cdot \sin 45^\circ)\hat{j}$

$\vec{v}_C = (4.448)\hat{i} + (4.448)\hat{j} \frac{ft}{s}$

$(10.39)\hat{i} + (6)\hat{j} = (0.1288 v_A)\hat{i} + (0.9917 v_A)\hat{j}$

$+ (0.7581 v_B)\hat{i} + (-0.6521 v_B)\hat{j} + (4.448)\hat{i}$

$+ (4.448)\hat{j}$

X-DIRECTION: $10.39 = 0.1288 v_A + 0.7581 v_B + 4.448$

$v_A = -5.886 v_B + 46.13$

Y-DIRECTION: $6 = 0.9917 v_A - 0.6521 v_B + 4.448$

$0.9917(-5.886 v_B + 46.13) - 0.6521 v_B = 1.552$

$v_B = 6.811 \frac{ft}{s}$, $v_A = 6.039 \frac{ft}{s}$

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