PROB. 14-21

$v_o = 12 \frac{ft}{s}$, $v_c = 6.29 \frac{ft}{s}$, FIND $v_A$ AND $v_B$

$m_A \vec{v}_{Ao} = m_A \vec{v}_A + m_B \vec{v}_B + m_c \vec{v}_c$

ASSUME ALL MASSES ARE EQUAL

$\vec{v}_{Ao} = \vec{v}_A + \vec{v}_B + \vec{v}_c$

$\vec{v}_{Ao} = (12 \cdot \cos 45°)\hat{i} + (12 \cdot \sin 45°)\hat{j} = (8.485)\hat{i} + (8.485)\hat{j}$ $\frac{ft}{s}$

$\vec{v}_A = (v_A \cdot \sin 4.3°)\hat{i} + (v_A \cdot \cos 4.3°)\hat{j}$

$\vec{v}_A = (0.07498\, v_A)\hat{i} + (0.9972\, v_A)\hat{j}$ $\frac{ft}{s}$

$\vec{v}_B = (v_B \cdot \sin 37.4°)\hat{i} + (-v_B \cdot \cos 37.4°)\hat{j}$

$\vec{v}_B = (0.6074\, v_B)\hat{i} + (-0.7944\, v_B)\hat{j}$ $\frac{ft}{s}$

$\vec{v}_c = (6.29 \cdot \cos 30°)\hat{i} + (6.29 \cdot \sin 30°)\hat{j}$

$\vec{v}_c = (5.447)\hat{i} + (3.145)\hat{j}$ $\frac{ft}{s}$

$[(8.485)\hat{i} + (8.485)\hat{j}] = (0.07498\, v_A)\hat{i} + (0.9972\, v_A)\hat{j}$

$+ (0.6074\, v_B)\hat{i} + (-0.7944\, v_B)\hat{j} + (5.447)\hat{i} + (3.145)\hat{j}$

X-DIRECTION: $8.485 = 0.07498\, v_A + 0.6074\, v_B + 5.447$

$v_A = -8.1\, v_B + 40.52$

Y-DIRECTION: $8.485 = 0.9972\, v_A - 0.7944\, v_B + 3.145$

$0.9972(-8.1\, v_B + 40.52) - 0.7944\, v_B = 5.34$

$v_B = 3.952 \frac{ft}{s}$, $v_A = 8.505 \frac{ft}{s}$

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