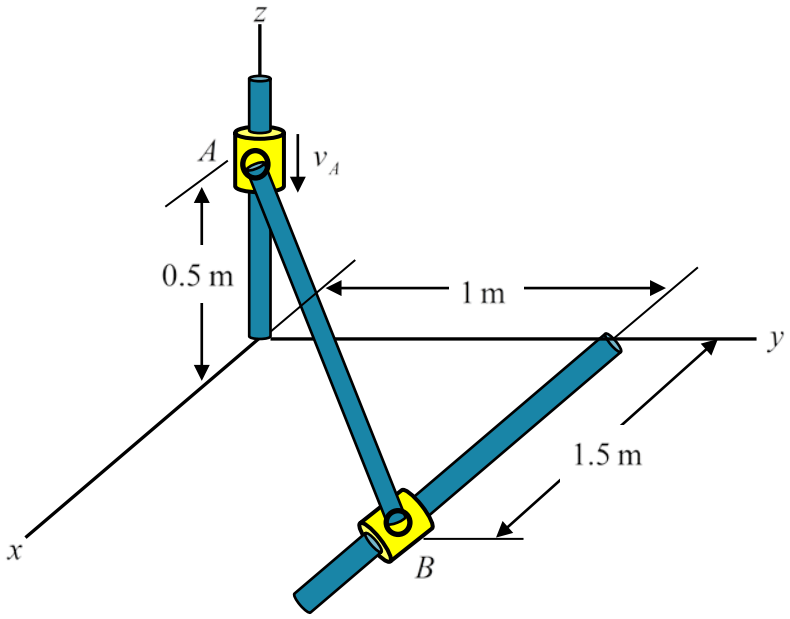
3-3. At the instant shown, collar *A* is moving downward with a velocity of $v_A \sim N(3, 0.06^2)$ m/s, determine the velocity of collar *B*.



$$\mathbf{r}_{B/A} = 1.5\mathbf{i} + \mathbf{j} - 0.5\mathbf{k}$$

$$\mathbf{v}_B = v_B\mathbf{i}$$

$$\mathbf{v}_B - \mathbf{v}_A = v_B\mathbf{i} - (-v_A\mathbf{k}) = v_B\mathbf{i} + v_A\mathbf{k}$$

Since $(\mathbf{v}_B - \mathbf{v}_A)\cdot\mathbf{r}_{B/A} = 0$

$$(v_B)(1.5) + (0)(1) + (v_A)(-0.5) = 0$$

$$v_B = \frac{1}{3}v_A$$

$$\mu_{v_B} = \frac{1}{3}\mu_{v_A} = \frac{1}{3}(3) = 1 \text{ m/s}$$

$$\sigma_{v_B} = \frac{1}{3}\sigma_{v_A} = \frac{1}{3}(0.06) = 0.02 \text{ m/s}$$

Therefore, $v_B \sim N(1, 0.02^2)$ m/s. **Ans.**