ฟิสิกส์ 5 : ระบบอนุภาค

(6.1) $\sum \vec{F} = \sum_i m_i \vec{a}_i = M \vec{a}_{CM}$

$$\vec{a}_{CM} = \frac{d^2 \vec{r}_{CM}}{dt^2}$$

$$\vec{r}_{CM} = \frac{m_1 \vec{r}_1 + m_2 \vec{r}_2 + m_3 \vec{r}_3}{m_1 + m_2 + m_3}$$

$$= \frac{10^{-3}\left[0.05(2t\hat{i} - 5t^2\hat{j}) + 0.02(5\hat{i} + 2t\hat{j}) + 0.01(4t\hat{i} - 3\hat{j})\right]}{[0.05 + 0.02 + 0.01] \times 10^{-3}}$$

$$= \frac{(0.1t + 0.1 + 0.04t)\hat{i} + (-0.25t^2 + 0.04t - 0.03)\hat{j}}{0.08}$$

$$= \frac{(0.14t + 0.1)\hat{i} + (-0.25t^2 + 0.04t - 0.03)\hat{j}}{0.08}$$

$$\vec{a}_{CM} = \frac{d^2 \vec{r}_{CM}}{dt^2} = \frac{1}{0.08}(-2)(0.25)\hat{j}$$

$$\therefore \quad \sum \vec{F} = M \vec{a}_{CM} = (0.08) \times 10^{-3} \frac{(-2)(0.25)}{0.08} \hat{j}$$

$$= -0.5 \hat{j} \times 10^{-3} \text{ N}$$

$$= -5 \times 10^{-4} \hat{j} \text{ N} \quad \#$$

(6.2)

$$\vec{p} = M\vec{V}_{CM}$$

$$\vec{V}_{CM} = \frac{d\vec{r}_{CM}}{dt} = \frac{(0.14)\hat{i} + (-0.5t + 0.04)\hat{j}}{0.08}$$

$$\vec{p} = \frac{[0.08 \times 10^{-3}]\,[0.14\hat{i} + (-0.5t + 0.04)\hat{j}]}{0.08}$$

$$= [14\hat{i} + (-50t + 4)\hat{j}] \times 10^{-5} \quad kg\,m/s$$

$$\vec{p}(t = 1\ s) = 14\hat{i} - 46\hat{j} \quad kg.m/s$$

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(6.3) ไม่ทำ (6.1)