

2.3. Vektor trenutne brzine materijalne točke koja se giba u xy -ravnini zadan je izrazom

$$\vec{v}(t) = 4t\vec{i} + 3t^2\vec{j} \text{ [ms}^{-1}\text{]}.$$

U trenutku $t = 0$ s vektor položaja materijalne točke je

$$\vec{r}_0 \equiv \vec{r}(t = 0s) = 2\vec{i} + 3\vec{j} \text{ [m]}.$$

Izračunajte vektor položaja $\vec{r}(t)$ materijalne točke $t = 1.2$ s.

$$\int_0^t v(t') dt'$$

$$\begin{aligned}\vec{r}(t) &= \vec{r}_0 + \int_0^t \vec{v}(\tau) d\tau \\ &= 2\vec{i} + 3\vec{j} + \int_0^t (4\tau\vec{i} + 3\tau^2\vec{j}) d\tau\end{aligned}$$

$$I = \int_0^t 4\tau d\tau \vec{i} + \int_0^t 3\tau^2 d\tau \vec{j}$$

$$= 4 \left. \frac{\tau^2}{2} \right|_0^t \vec{i} + 3 \left. \frac{\tau^3}{3} \right|_0^t \vec{j}$$

$$= 2(\tau^2 - 0^2)\vec{i} + (\tau^3 - 0^3)\vec{j}$$

$$= 2\tau^2\vec{i} + \tau^3\vec{j}$$

$$\vec{r}(t) = 2\vec{i} + 3\vec{j} + 2\tau^2\vec{i} + \tau^3\vec{j}$$

$$\vec{r}(t) = 2(1 + \tau^2)\vec{i} + (3 + \tau^3)\vec{j}$$

$$\begin{aligned}\vec{r}(t = 1.2s) &= 2(1 + 1.2^2)\vec{i} + (3 + 1.2^3)\vec{j} \\ &= 4.88\vec{i} + 4.728\vec{j} \text{ [m]}\end{aligned}$$

PAZI !!!

$$\int_0^t e^x dx = \left. e^x \right|_0^t = e^t - e^0 = e^t - 1$$