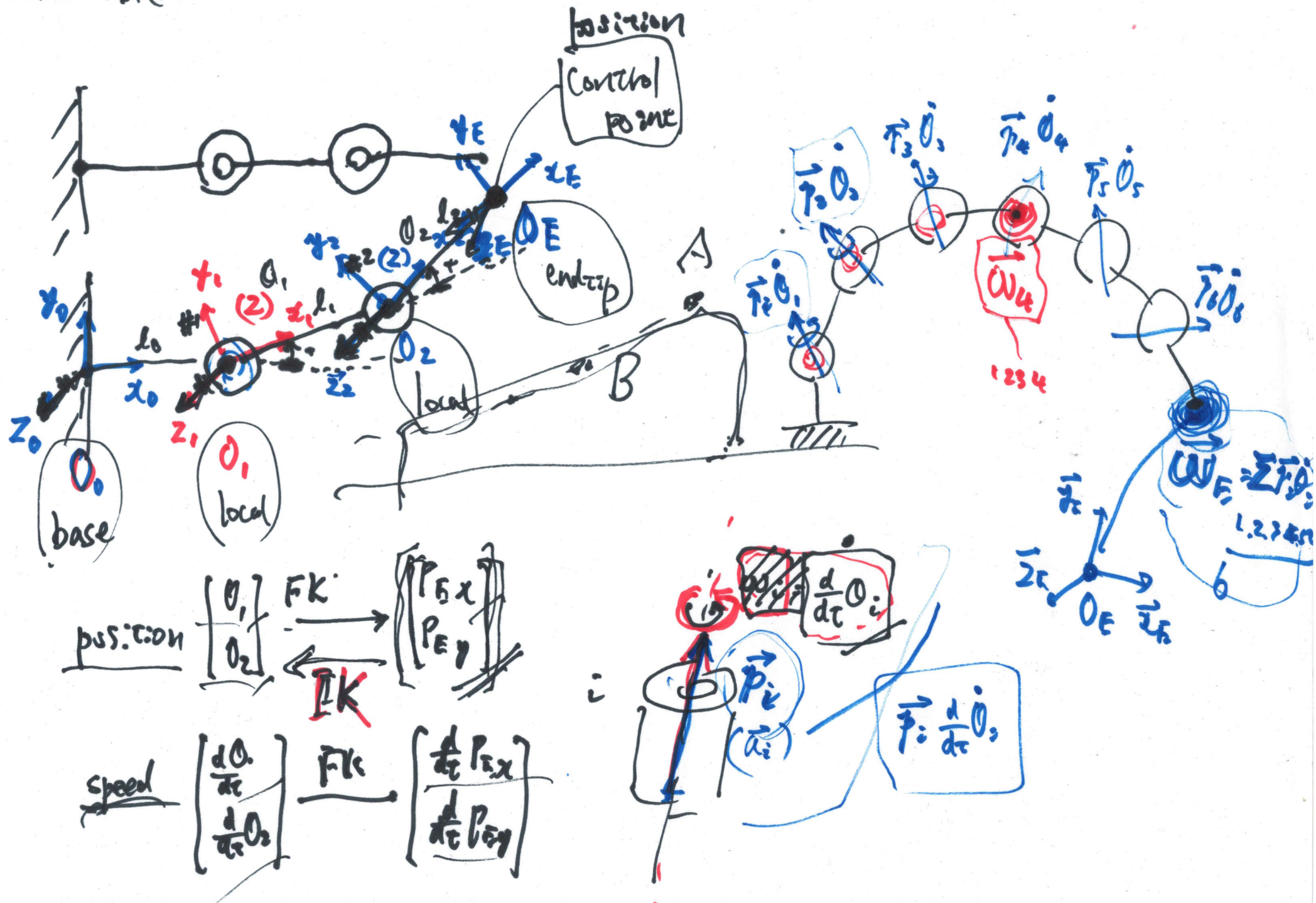
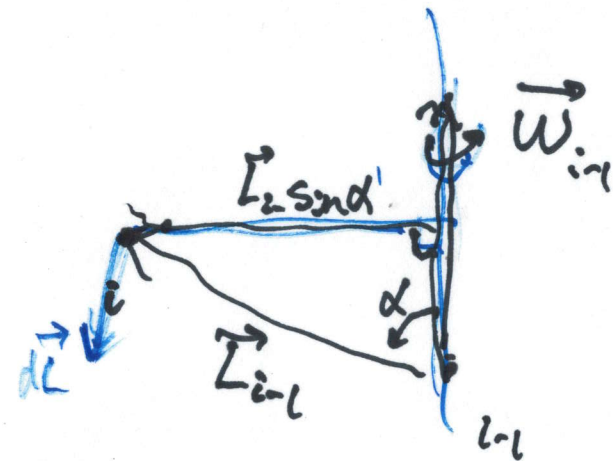
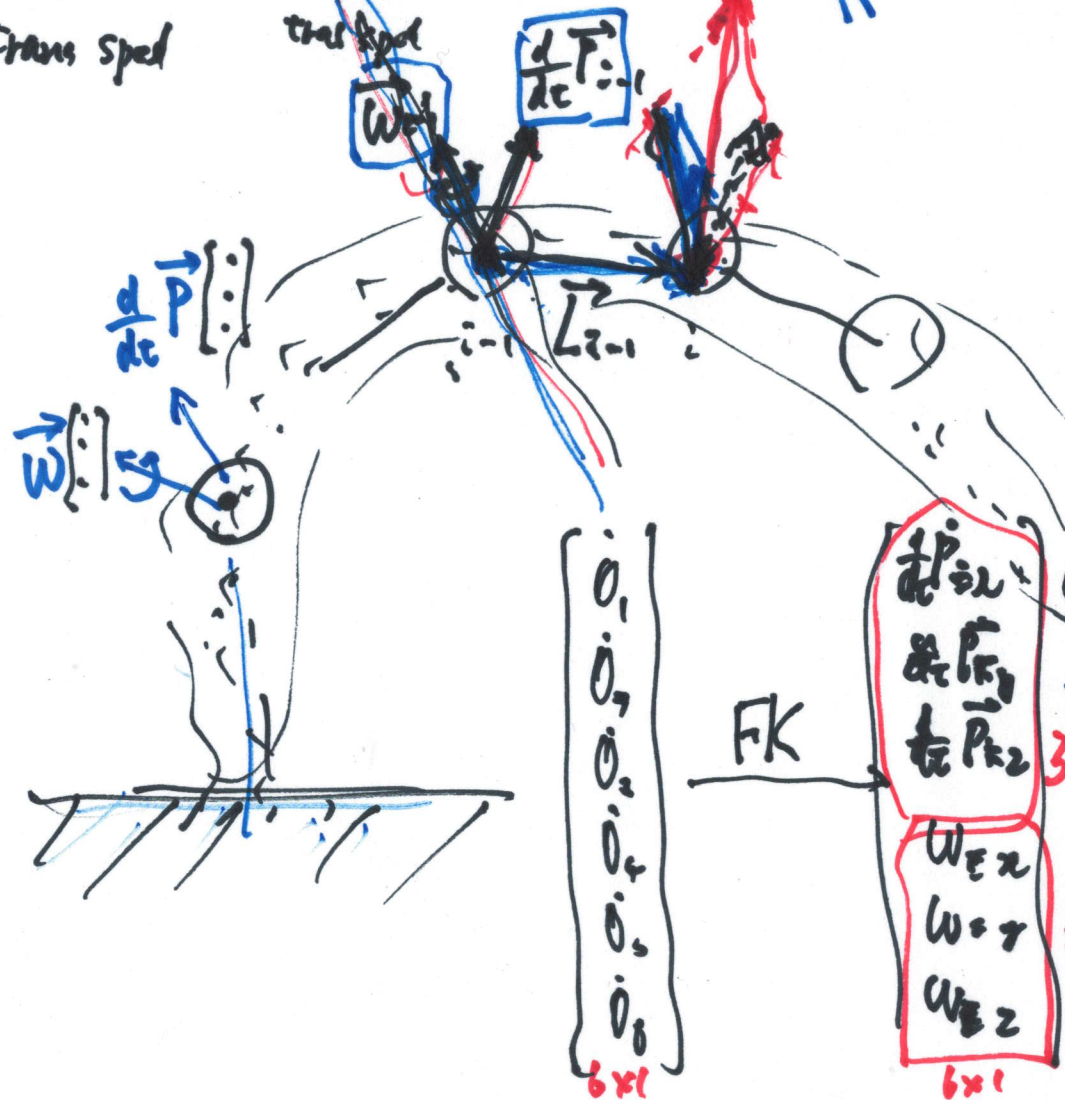


2025.11.26 Rbt(12) - 1/5



$$\frac{d\vec{p}_i}{d\tau} = \frac{d\vec{p}_{(i-1)}}{d\tau} + \vec{\omega}_{(i-1)} \times \vec{L}_{i-1} \quad (66)$$

O_i
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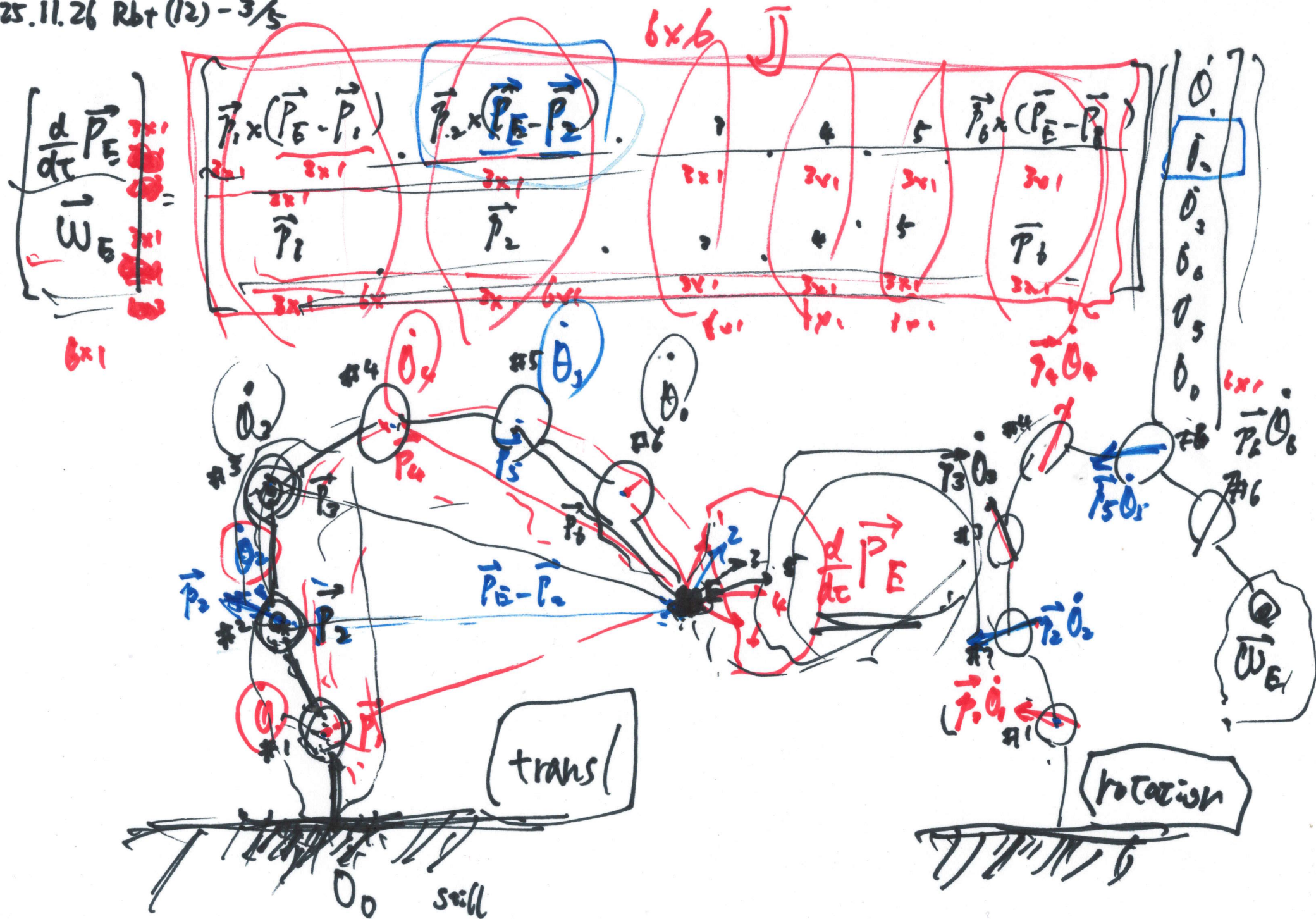
FK

$$\begin{bmatrix} \frac{d\vec{p}_{i1}}{d\tau} \\ \frac{d\vec{p}_{i2}}{d\tau} \\ \frac{d\vec{p}_{i3}}{d\tau} \\ \vec{\omega}_{i1} \\ \vec{\omega}_{i2} \\ \vec{\omega}_{i3} \end{bmatrix} \quad \begin{matrix} \text{trans} \\ 3 \text{ vec} \\ \text{rot} \\ 3 \text{ vec} \end{matrix}$$

6×1

$$\frac{d\vec{L}}{d\tau} = \vec{\omega} \times \vec{L}$$

2025.11.26 Rbt (12) - 3/5



2025.11.26 Rht (12) - 4/5

$$\begin{bmatrix} \vec{X}_i \\ \vec{Y}_i \\ \vec{Z}_i \end{bmatrix} = \begin{bmatrix} \vec{X}_{i-1} & \vec{Y}_{i-1} & \vec{Z}_{i-1} \end{bmatrix} \begin{bmatrix} C_{i1} & C_{i2} & C_{i3} \\ C_{i4} & C_{i5} & C_{i6} \\ C_{i7} & C_{i8} & C_{i9} \end{bmatrix}$$

$\begin{matrix} 3 \times 1 & 3 \times 1 & 3 \times 1 & 3 \times 3 \end{matrix}$

$$= \begin{bmatrix} \vec{X}_{i-2} & \vec{Y}_{i-2} & \vec{Z}_{i-2} \end{bmatrix} \begin{bmatrix} C_{i-1} & C_i \end{bmatrix}$$

$$= \begin{bmatrix} \vec{X}_0 & \vec{Y}_0 & \vec{Z}_0 \end{bmatrix} \begin{bmatrix} C_1 & C_2 & C_3 & \dots & C_i \end{bmatrix}$$

$$= \begin{bmatrix} \vec{X}_0 & \vec{Y}_0 & \vec{Z}_0 \end{bmatrix} \begin{bmatrix} C_i \end{bmatrix}$$

$\begin{matrix} 3 \times 3 \end{matrix}$

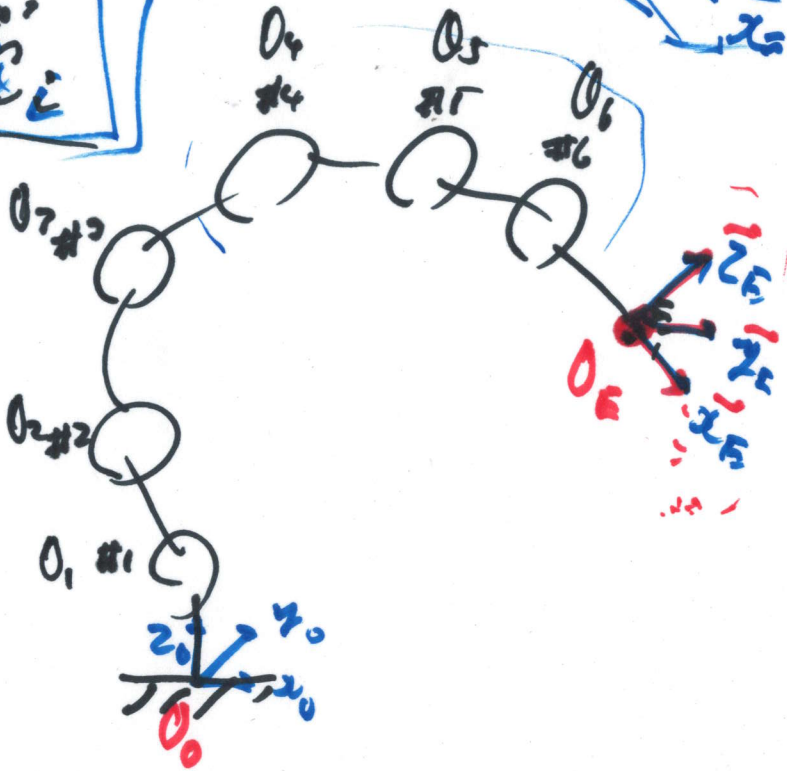
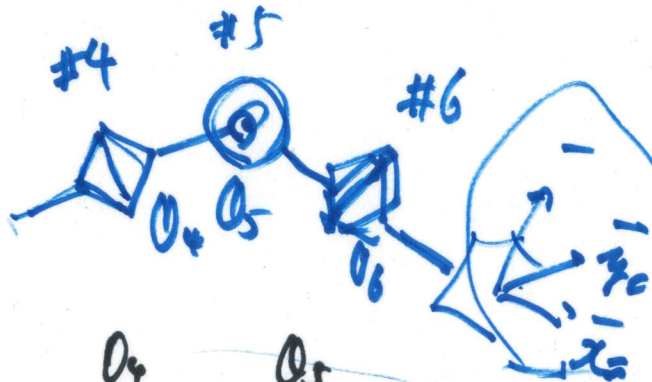
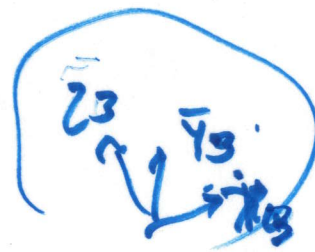
$$\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

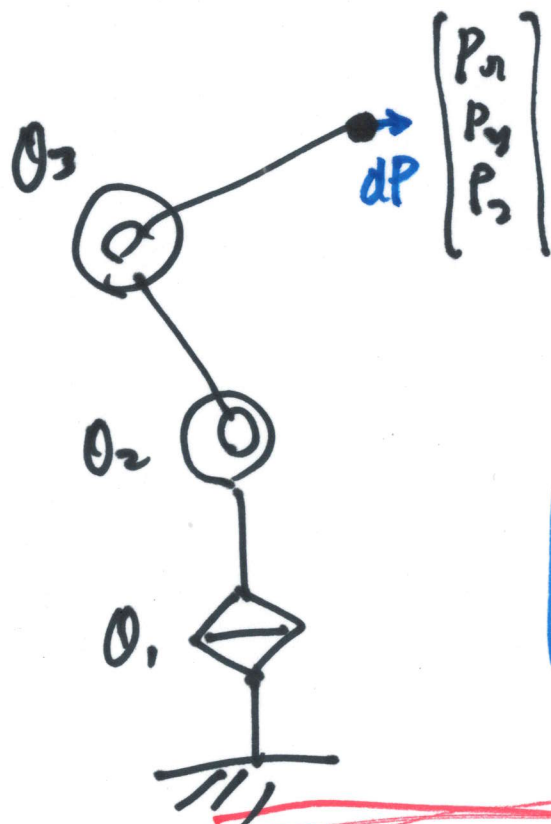
$\begin{matrix} 3 \times 3 \end{matrix}$

local

base

$$\begin{bmatrix} C_{i1} \\ C_{i2} \\ C_{i3} \end{bmatrix} \begin{bmatrix} C_{i4} \\ C_{i5} \\ C_{i6} \end{bmatrix}$$





$$\begin{bmatrix} 0_1 \\ 0_2 \\ 0_3 \end{bmatrix} \xrightarrow{FK} \begin{bmatrix} P_x \\ P_y \\ P_z \end{bmatrix} \xrightarrow{\Delta x / \Delta x / \Delta z} \begin{bmatrix} P_x + \Delta x \\ P_y + 0 \\ P_z + \Delta z \end{bmatrix} \xrightarrow{FK} \begin{bmatrix} 0_1 \\ 0_2 \\ 0_3 \end{bmatrix} \xrightarrow{FK} \begin{bmatrix} P_x \\ P_y \\ P_z \end{bmatrix} \xrightarrow{\Delta x / \Delta x / \Delta z} \begin{bmatrix} P_x + \Delta x \\ P_y + \Delta y \\ P_z + \Delta z \end{bmatrix} \xrightarrow{FK} \begin{bmatrix} 0_1 \\ 0_2 \\ 0_3 \end{bmatrix} \xrightarrow{FK}$$

$\Delta x / \Delta x / \Delta z$
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input

$$\begin{bmatrix} +\Delta x & -\Delta x \\ +\Delta y & -\Delta y \\ +\Delta z & -\Delta z \end{bmatrix}$$

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