

TESA 2025 Offensive

Idea : ក្នុងបានចិត្តរាយដែលមានសម្រាប់
ក្នុងបានចិត្តរាយដែលមាន GPS សម្រាប់

Pre-Camp Overview

1. Sensors in Drone
2. Drone Motion
3. Eulerangle, Rotation matrix
4. Reference Frame, Body Frame
5. Rotationmatrix, Representation, Hat Operation
6. State Equation → (Force, Moment)

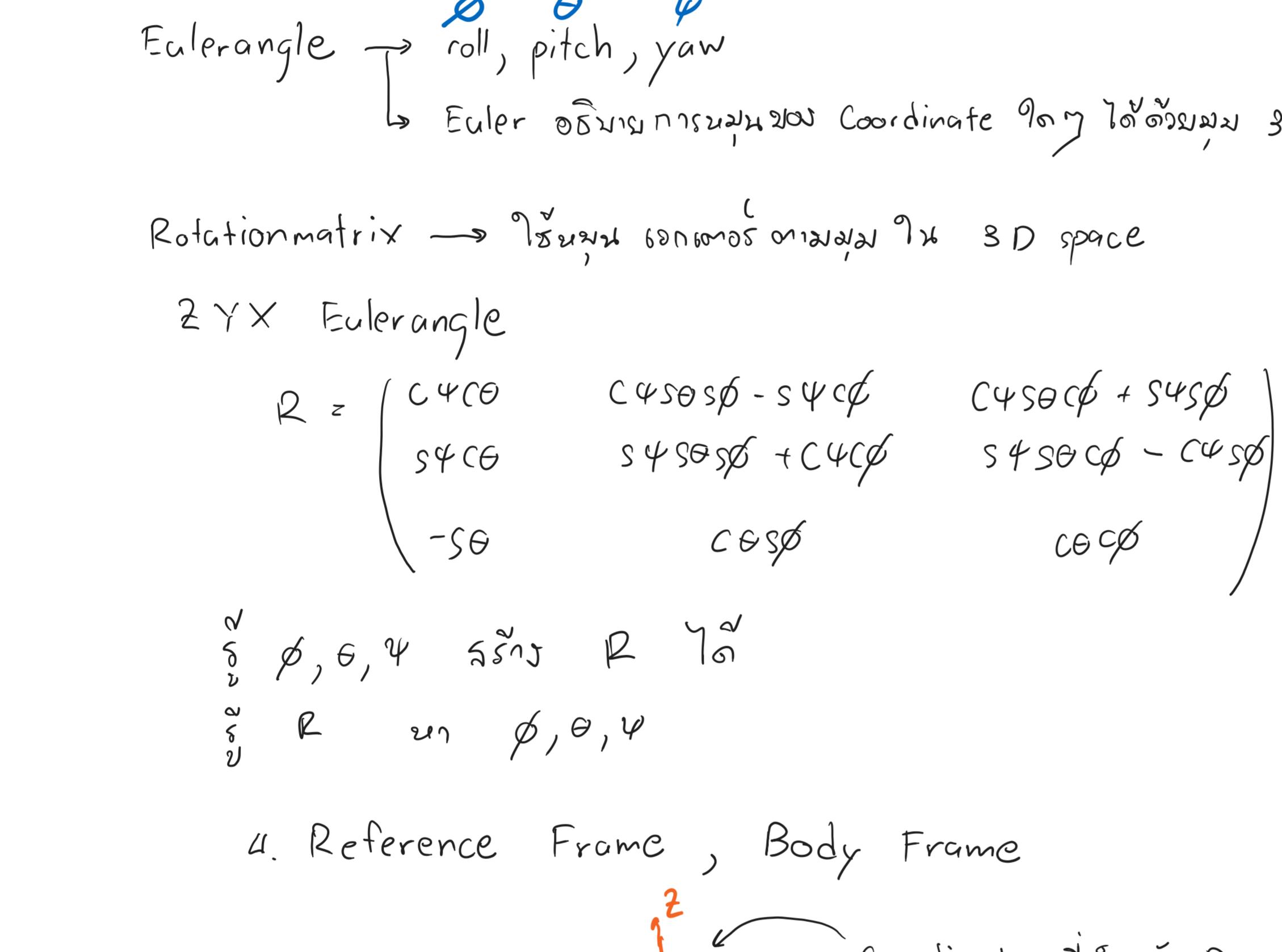
1. Sensors in Drone

- (1) IMU
 ↗ Inertial Measurement unit
 ↗ Acceleration
 ↗ Angular velocity (Gyroscope)
 ↗ Option
 ↗ Magnetometer

- (2) GPS → តួនាទី → lat, long
 ↗ Height

- 3) Barometer → វត្ថុរាយ
 4) Lidar → គុណភាព, ពិន្ទុ Point cloud
 5) Camera → Object Detection
 6) RTK → តម្លៃតាមតម្លៃ (តាមអេក្រង់ GPS)
 7) Temperature → វត្ថុរាយ

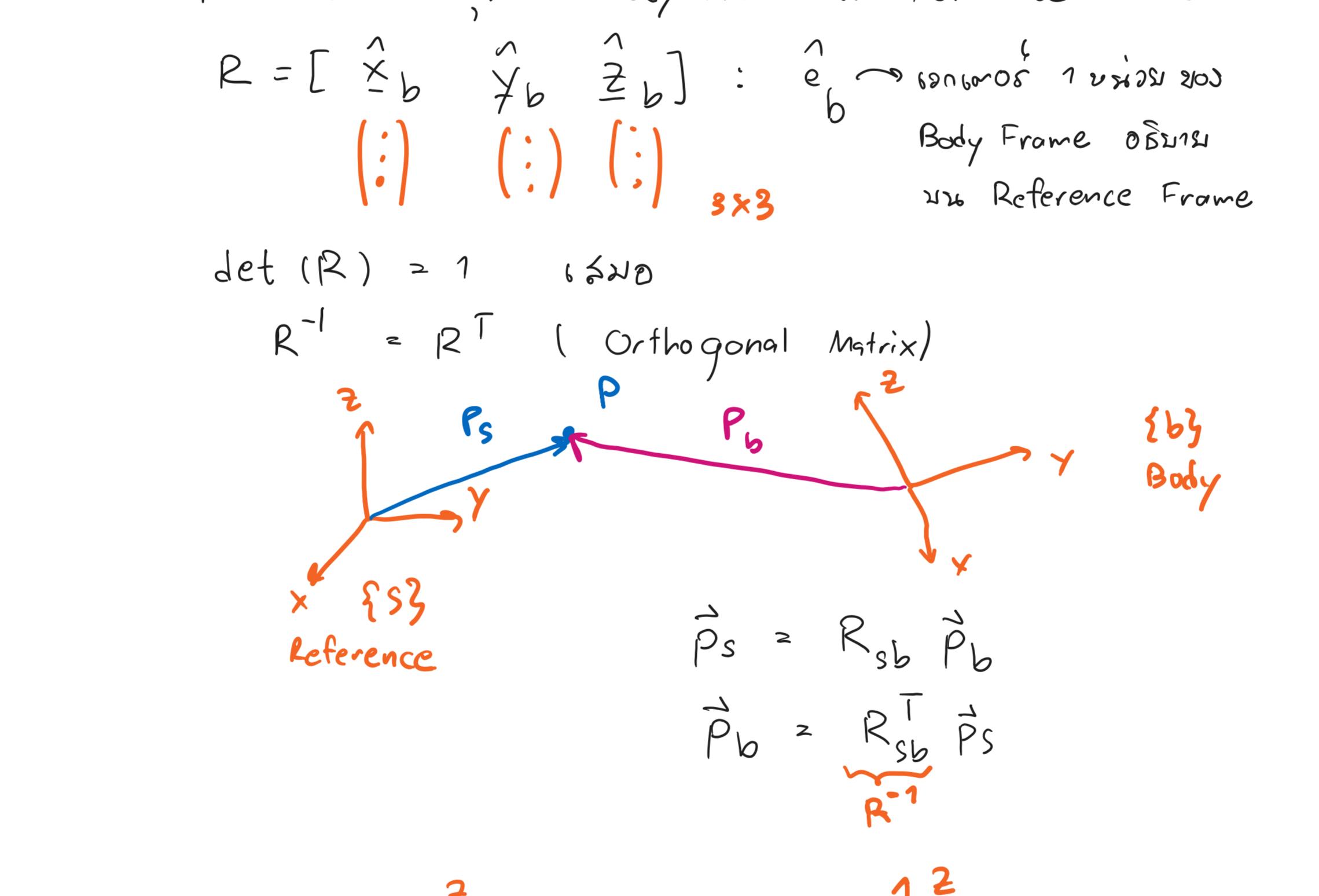
2. Drone Motion (Quadrotors)



3. Eulerangle, Rotationmatrix

Eulerangle → roll, pitch, yaw
 Euler angle ទិន្នន័យការរាយការណ៍ Coordinate ទាំង 3 តាមរយៈ
 $R = \begin{pmatrix} C\theta C\phi & C\theta S\phi - S\psi C\phi & C\psi S\phi + S\theta C\phi \\ S\theta C\phi & S\psi S\phi + C\theta C\phi & S\psi C\phi - C\theta S\phi \\ -S\phi & C\theta S\phi & C\theta C\phi \end{pmatrix}$
 $\begin{cases} \theta, \phi, \psi \text{ ស្នើសុំ } R \end{cases}$
 $\begin{cases} R \text{ នូវ } \theta, \phi, \psi \end{cases}$

4. Reference Frame, Body Frame



5. Rotationmatrix, Representation, Hat Operator.

$R \rightarrow$ ការរាយការណ៍ Body Frame នៃ Reference Frame
 $R = [\hat{x}_b \hat{y}_b \hat{z}_b] : \hat{e}_b \rightarrow$ ការរាយការណ៍ នៃការណ៍
 Body Frame នៃ Reference Frame
 $\hat{x}_b \hat{y}_b \hat{z}_b$

$\det(R) = 1$ ស្មើនា
 $R^{-1} = R^T$ (Orthogonal Matrix)

$\vec{P}_s = R_{sb} \vec{P}_b$
 $\vec{P}_b = R_{sb}^T \vec{P}_s$

$\vec{e}_b = R \cdot \vec{e}_s$

$\vec{e}_s = R^{-1} \cdot \vec{e}_b$

$\vec{e}_s = R^T \cdot \vec{e}_b$

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