$$(y_{k+i} - \bar{y}_k)^T Q_y (y_{k+i} - \bar{y}_k)$$

TARGET

$$\bar{y}_k = \bar{C}\,\bar{z}_k + \underbrace{h(\bar{z}_{k-1}) - \bar{C}(\bar{z}_{k-1})}_{\bar{y}_0} + \hat{d}_k$$

DyN. OPT

$$y_{k+i} = C_k z_{k+i} + \underbrace{h(\hat{z}_k) - C_k \hat{z}_k}_{\hat{y}_k} + \hat{d}_k$$

$$y_{k+i} - \bar{y}_k = C_k z_{k+i} + \underbrace{\hat{y}_k - \bar{C}\,\bar{z}_k - \bar{y}_0}_{\alpha_k}$$

$$= z_{k+i}^T C_k^T Q_y C_k z_{k+i} + \alpha_k^T Q_y \alpha_k + 2\,\alpha_k^T Q_y C_k z_{k+i}$$

$$\bar{y}_k = \bar{C}\,\bar{z}_k + \hat{d}_k$$

$$y_{k+i} = \bar{C}\,z_{k+i} + \hat{d}_k$$

TARGET

(1) $\bar{y}_k = C\,\bar{z}_k + \hat{d}_k$

(2) $\bar{y}_k = h(\bar{z}_{k-1}) + J_{\bar{z}_{k-1}}\left(\bar{z}_k - \bar{z}_{k-1}\right) + \hat{d}_k$

(3) $\bar{y}_k = h(\hat{z}_k) + J_{\hat{z}_k}\left(\bar{z}_k - \hat{z}_k\right) + \hat{d}_k$

DYN. OPT

(1) $y_{k+i} = C\,z_{k+i} + \hat{d}_k$

(2) $y_{k+i} = h(\bar{z}_{k-1}) + J_{\bar{z}_{k-1}}\left(z_{k+i} - \bar{z}_{k-1}\right) + \hat{d}_k$

(3) $y_{k+i} = h(\hat{z}_k) + J_{\hat{z}_k}\left(z_{k+i} - \hat{z}_k\right) + \hat{d}_k$

(4) $y_{k+i} = h(\bar{z}_k) + J_{\bar{z}_k}\left(z_{k+i} - \bar{z}_k\right) + \hat{d}_k$

DYN

TARG.

	(1)	(2)	(3)	(4)
(1)	≠V	≈	≈	≈
(2)	≈	·	~	~
(3)	≈		~	

ESTIMATION / OBSERVER

①-① : KF

others : EKF

Prediction
$$\begin{cases} \hat{z}_{k|k-1} = A\,\hat{z}_{k-1|k-1} + B\,u_{k-1} \\ \hat{d}_{k|k-1} = \hat{d}_{k-1|k-1} \end{cases}$$

Filtering
$$\begin{cases} e_k = y_k - \left(h\left(\hat{z}_{k|k-1}\right) + \hat{d}_{k|k-1}\right) \\ \begin{bmatrix} \hat{z}_{k|k} \\ \hat{d}_{k|k} \end{bmatrix} = \begin{bmatrix} \hat{z}_{k|k-1} \\ \hat{d}_{k|k-1} \end{bmatrix} + K_k\, e_k \end{cases}$$

$$\begin{bmatrix} z \\ d \end{bmatrix}_{k|k-1} = \underbrace{\begin{bmatrix} A & 0 \\ 0 & I \end{bmatrix}}_{A_a} \begin{bmatrix} z \\ d \end{bmatrix}_{k-1} + \underbrace{\begin{bmatrix} B \\ 0 \end{bmatrix}}_{B_a} u_{k-1}$$

$$y_k = \underbrace{\begin{bmatrix} \frac{\partial h}{\partial z}\Big|_{\hat{z}_{k|k-1}} & I \end{bmatrix}}_{C_{a,k}} \begin{bmatrix} z \\ d \end{bmatrix}_{k-1}$$

EKF

$$P_{k|k-1} =$$