

# 1.

$$\frac{d(R^{-1}P)}{dR} = \lim_{\varphi \rightarrow 0} \frac{[R \cdot \exp(\varphi^1)]^{-1}P - R^{-1}P}{\varphi}$$

右乘

$$= \lim_{\varphi \rightarrow 0} \frac{\exp(-\varphi^1) \cdot R^{-1} \cdot P - R^{-1}P}{\varphi}$$

~~错误修正  
进行改正~~

$$= \lim_{\varphi \rightarrow 0} \frac{(I + \varphi^1)^{-1} R^{-1}P - R^{-1}P}{\varphi}$$

$$= \lim_{\varphi \rightarrow 0} \frac{(I - \varphi^1) R^{-1}P - R^{-1}P}{\varphi}$$

$$= \lim_{\varphi \rightarrow 0} \frac{-\varphi^1 (R^{-1}P)}{\varphi}$$

$$= \lim_{\varphi \rightarrow 0} \frac{(R^{-1}P)^1 \varphi}{\varphi}$$

$$= (R^{-1}P)^1$$

因为  $\exp(\varphi^1) = R = (R^T)^{-1}$ , 则其等价于反向旋距.  $\varphi = -\varphi$

所以  $\exp(\varphi^1)^{-1} = \exp(-\varphi^1)$

$$= \lim_{\varphi \rightarrow 0} \frac{\exp(-\varphi^1) \cdot R^{-1} \cdot P - R^{-1} \cdot P}{\varphi}$$

Taylor 展开

$$\begin{aligned} &= \lim_{\varphi \rightarrow 0} \frac{\exp((-\varphi)^1)}{\varphi} \\ &= \lim_{\varphi \rightarrow 0} \frac{\sum_{n=0}^{\infty} \frac{1}{n!} ((-\varphi)^1)^n}{\varphi} \\ &= I + (-\varphi)^1 + \dots \end{aligned}$$

$$= \lim_{\varphi \rightarrow 0} \frac{(I - \varphi^1) R^{-1} \cdot P - R^{-1} \cdot P}{\varphi}$$

$$\lim_{\varphi \rightarrow 0} \frac{-\varphi^1 R^{-1} p}{\varphi} \stackrel{\downarrow}{\sim} I - R^{-1}$$

$$\lim_{\varphi \rightarrow 0} \frac{(R^{-1} p)^1 \varphi}{\varphi}$$

$(R^{-1} p)^1$  改正方程式.

# Q1. 二元二次型的矩阵表示.

$$\frac{d [\exp(\phi^1)^{-1} \cdot p]}{d \phi} = \lim_{\Delta\phi \rightarrow 0} \frac{\exp((\phi + \Delta\phi)^1)^{-1} p - \exp(\phi^1)^{-1} p}{\Delta\phi}$$

根据性质  $\exp((\phi + \Delta\phi)^1) = \exp(\phi^1) \cdot \exp((Jr \cdot \Delta\phi)^1)$

$$\text{有 } \frac{d[\exp(\phi^1) \cdot \exp((Jr \cdot \Delta\phi)^1)]^{-1} p - \exp(\phi^1)^{-1} p}{d\phi} = \lim_{\Delta\phi \rightarrow 0}$$

$a^{-1} \cdot b^{-1} = b^{-1} \cdot a^{-1}$  形式

$$= \lim_{\Delta\phi \rightarrow 0} \frac{\exp((Jr \cdot \Delta\phi)^1)^{-1} \cdot \exp(\phi^1)^{-1} \cdot p - \exp(\phi^1)^{-1} \cdot p}{\Delta\phi}$$

$$= \lim_{\Delta\phi \rightarrow 0} \frac{[\exp((Jr \cdot \Delta\phi)^1)^{-1} - I] \cdot \exp(\phi^1)^{-1} \cdot p}{\Delta\phi}$$

现在分析  $\exp((Jr \cdot \Delta\phi)^1)^{-1} - I$  项

将通项为负号

$$= \exp((-Jr \cdot \Delta\phi)^1) - I$$

Taylor 展开

$$\approx I - (Jr \cdot \Delta\phi)^1 - I$$

$$= -(Jr \cdot \Delta\phi)^1$$

2) 序式为



$$\begin{aligned} &= \lim_{\Delta\phi \rightarrow 0} \frac{-(Jr \cdot \Delta\phi)^1 \cdot \exp(\phi^1)^{-1} \cdot p}{\Delta\phi} \\ &= \lim_{\Delta\phi \rightarrow 0} \frac{[\exp(\phi^1)^{-1} \cdot p]^1 \cdot Jr \cdot \Delta\phi}{\Delta\phi} \\ &= [\exp(\phi^1)^{-1} \cdot p]^1 \cdot Jr \\ &= (R^{-1}p)^1 \cdot Jr \end{aligned}$$

# 2.

$$\begin{aligned}
 & \frac{d[\ln(R_1 R_2^{-1})]^V}{dR_2} = \lim_{\varphi \rightarrow 0} \frac{[\ln(R_1 \cdot (R_2 \cdot \exp(\varphi^1))^{-1})]^V - [\ln(R_1 R_2^{-1})]^V}{d\varphi} \\
 &= \lim_{\varphi \rightarrow 0} \frac{[\ln(R_1 \cdot \exp^{-1}(\varphi^1) \cdot R_2^{-1})]^V - [\ln(R_1 R_2^{-1})]^V}{d\varphi} \\
 &\quad \text{z.B.: } \exp^{-1}(\varphi^1) = \exp(-\varphi^1) \\
 &= \lim_{\varphi \rightarrow 0} \frac{[\ln(R_1 \cdot R_2^{-1} R_2 \exp(-\varphi^1) \cdot R_2^{-1})]^V - [\ln(R_1 R_2^{-1})]^V}{d\varphi} \\
 &= \lim_{\varphi \rightarrow 0} \frac{[\ln(R_1 R_2^{-1} \exp(-(R_2 \varphi)^1))]^V - [\ln(R_1 R_2^{-1})]^V}{d\varphi} \\
 &= \lim_{\varphi \rightarrow 0} \frac{\ln(R_1 R_2^{-1})^V + J_r^{-1}(\ln(R_1 R_2^{-1})^V)(-R_2 \varphi) - \ln(R_1 R_2^{-1})^V}{d\varphi} \\
 &= -J_r^{-1} [\ln(R_1 R_2^{-1})]^V R_2
 \end{aligned}$$

由 SLAU 4.28(1,3)

$$[\ln(\exp(\phi_1^1) \cdot \exp(\phi_2^1))]^V = J_r(\phi_1)^{-1} \cdot \phi_2 + \phi_1$$



$$[\ln(R \cdot \exp(\varphi^1))]^V = J_r^{-1}(\phi_1) \cdot \varphi + [\ln(R)]^V$$