

PRECONDITIONER on rotation increment

$$G = \hat{C}^{-1} - I$$

$$D = \frac{1}{2}G + \frac{1}{4}G^2 - \frac{1}{6}G^3 + \frac{1}{8}G^4$$

$$\hat{U} = I + D + \frac{1}{2}D^2 + \frac{1}{6}D^3$$

$$\begin{aligned} D^2 &= \left[\frac{1}{4}G^2 - \frac{1}{8}G^3 \right] + \frac{1}{12}G^4 - \frac{1}{16}G^5 \\ &\quad - \frac{1}{8}G^3 + \frac{1}{16}G^4 - \frac{1}{24}G^5 + \frac{1}{32}G^6 \\ &= \frac{1}{4}G^2 - \frac{1}{4}G^3 \end{aligned}$$

$$D^3 = \frac{1}{8}G^3 + \dots$$

$$\begin{aligned} \hat{U} &= I + \left[\frac{1}{2}G + \frac{1}{4}G^2 - \frac{1}{6}G^3 \right] \\ &\quad + \frac{1}{2} \left[\frac{1}{4}G^2 - \frac{1}{4}G^3 \right] \\ &\quad + \frac{1}{6} \left[\frac{1}{8}G^3 \right] \end{aligned}$$

$$= I - \frac{1}{2}G + \frac{1}{4}G^2 - \frac{1}{6}G^3 + \frac{1}{8}G^2 - \frac{1}{8}G^3 - \frac{1}{48}G^3$$

$$= I - \frac{1}{2}G + \frac{3}{8}G^2 - \frac{15}{48}G^3$$

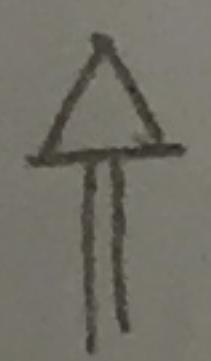
$$\hat{U} = I - \frac{1}{2}G + \frac{3}{8}G^2 - \frac{5}{16}G^3 \quad \checkmark$$

$$\hat{F}^{-1} = \hat{U}^{-1} \hat{R}^T$$

$$P\hat{F}^{-1} \approx \hat{R}^T, \text{ where } P \approx \hat{U}$$

$$P\hat{F}^{-1} = P(I-A) = P - PA$$

$$\begin{cases} \varepsilon_{ijk}(P\hat{F}^{-1})_{jk} = \varepsilon_{ijk}P_{jk} - \varepsilon_{ijk}(PA)_{jk} \\ \text{tr}(P\hat{F}^{-1}) - 1 = \text{tr}P - \text{tr}(PA) - 1 \\ = 2 - \text{tr}(PA) + \text{tr}\left(\frac{1}{2}G + \frac{3}{8}G^2 - \frac{5}{16}G^3\right) \end{cases}$$



OLD IMITOR

$$\text{USING } A = I - \hat{F}^{-1}$$

$$H = C - I$$

$$D = \frac{1}{2}H - \frac{1}{4}H^2 + \frac{1}{6}H^3 - \frac{1}{8}H^4$$

$$\hat{U}^{-1} = I - D + \frac{1}{2}D^2 - \frac{1}{6}D^3$$

$$D^2 = \frac{1}{4}H^2 - \frac{1}{8}H^3 - \frac{1}{8}H^3 + \dots = \frac{1}{4}H^2 - \frac{1}{4}H^3 + \dots$$

$$D^3 = \frac{1}{8}H^3 + \dots$$

$$\hat{U}^{-1} = I - \left[\frac{1}{2}H - \frac{1}{4}H^2 + \frac{1}{6}H^3 \right]$$

$$+ \frac{1}{2} \left[\frac{1}{4}H^2 - \frac{1}{4}H^3 \right] - \frac{1}{6} \left[\frac{1}{8}H^3 \right]$$

$$= I - \frac{1}{2}H + \frac{1}{4}H^2 - \frac{1}{6}H^3$$

$$+ \frac{1}{8}H^2 - \frac{1}{8}H^3 - \frac{1}{48}H^3$$

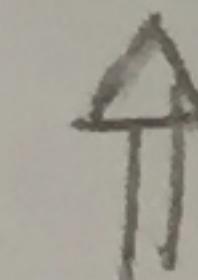
$$\boxed{\hat{U}^{-1} = I - \frac{1}{2}H + \frac{3}{8}H^2 - \frac{5}{16}H^3} \quad \checkmark$$

$$\hat{F} = \hat{R}\hat{U}$$

$$\hat{F}P \approx \hat{R}, \text{ where } P \approx \hat{U}^{-1}$$

$$\hat{F}P = (B+I)P = BP + P$$

$$\begin{cases} \varepsilon_{ijk}(\hat{F}P)_{jk} = \varepsilon_{ijk}(BP)_{jk} + \varepsilon_{ijk}P_{jk} \\ \text{tr}(\hat{F}P) - 1 = \text{tr}(BP) + \text{tr}(P) - 1 \\ = 2 + \text{tr}(BP) + \text{tr}\left(\frac{1}{2}H + \frac{3}{8}H^2 - \frac{5}{16}H^3\right) \end{cases}$$



NEW IMITOR

$$\text{USING } B = \hat{F} - I$$