SE(3) WNOA Interp Jacobians

$$
\begin{aligned}
\hat{\boldsymbol{\varpi}} &= \mathcal{J}(\ln(\hat{\mathbf{T}}(\tau)\hat{\mathbf{T}}_k^{-1})^\vee)(\boldsymbol{\Lambda}_2(\tau)\hat{\boldsymbol{\gamma}}_k(t_k) + \boldsymbol{\Psi}_2(\tau)\hat{\boldsymbol{\gamma}}_k(t_{k+1})) \\
&= \mathcal{J}(\boldsymbol{\Lambda}_1(\tau)\hat{\boldsymbol{\gamma}}_k(t_k) + \boldsymbol{\Psi}_1(\tau)\hat{\boldsymbol{\gamma}}_k(t_{k+1}))\Big[\underbrace{\boldsymbol{\Lambda}_2(\tau)\hat{\boldsymbol{\gamma}}_k(t_k) + \boldsymbol{\Psi}_2(\tau)\hat{\boldsymbol{\gamma}}_k(t_{k+1})}_{\boldsymbol{\varpi}_\tau}\Big]
\end{aligned}
$$

$$
\hat{\boldsymbol{\gamma}}_k(t_k) = \begin{bmatrix} \mathbf{0} \\ \hat{\boldsymbol{\varpi}}_k \end{bmatrix}, \quad \hat{\boldsymbol{\gamma}}_k(t_{k+1}) = \begin{bmatrix} \ln(\hat{\mathbf{T}}_{k+1,k})^\vee \\ \mathcal{J}(\ln(\hat{\mathbf{T}}_{k+1,k})^\vee)^{-1}\hat{\boldsymbol{\varpi}}_{k+1} \end{bmatrix}
$$

$$
\hat{\boldsymbol{\gamma}}_k(t_{k+1}) \approx \begin{bmatrix} \ln(\hat{\mathbf{T}}_{\mathrm{op},k+1,k})^\vee + \mathcal{J}_{\mathrm{op},k+1,k}^{-1}(\boldsymbol{\epsilon}_{k+1} - \mathcal{T}_{\mathrm{op},k+1,k}\boldsymbol{\epsilon}_k) \\ \left(\mathcal{J}_{\mathrm{op},k+1,k}^{-1} - \frac{1}{2}\left(\mathcal{J}_{\mathrm{op},k+1,k}^{-1}(\boldsymbol{\epsilon}_{k+1} - \mathcal{T}_{\mathrm{op},k+1,k}\boldsymbol{\epsilon}_k)\right)^\curlywedge\right)(\boldsymbol{\varpi}_{\mathrm{op},k+1} + \boldsymbol{\eta}_{k+1}) \end{bmatrix}
$$

$$
\begin{aligned}
\frac{\partial\hat{\boldsymbol{\varpi}}(\tau)}{\partial\mathbf{x}} &= \mathcal{J}_{\mathrm{op},\tau,k}\frac{\partial}{\partial\mathbf{x}}\Big[\boldsymbol{\Lambda}_2(\tau)\hat{\boldsymbol{\gamma}}_k(t_k) + \boldsymbol{\Psi}_2(\tau)\hat{\boldsymbol{\gamma}}_k(t_{k+1})\Big] \\
&\quad - \frac{1}{2}\boldsymbol{\varpi}_{\mathrm{op},\tau}^\curlywedge\frac{\partial}{\partial\mathbf{x}}\Big[\boldsymbol{\Lambda}_1(\tau)\hat{\boldsymbol{\gamma}}_k(t_k) + \boldsymbol{\Psi}_1(\tau)\hat{\boldsymbol{\gamma}}_k(t_{k+1})\Big]
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial\boldsymbol{\varpi}_\tau}{\partial\boldsymbol{\epsilon}_{k+1}} &= \Psi_{21}\mathcal{J}_{\mathrm{op},k+1,k}^{-1} + \frac{1}{2}\Psi_{22}\boldsymbol{\varpi}_{\mathrm{op},k+1}^\curlywedge\mathcal{J}_{\mathrm{op},k+1,k}^{-1} \\
\frac{\partial\boldsymbol{\varpi}_\tau}{\partial\boldsymbol{\epsilon}_k} &= -\Psi_{21}\mathcal{J}_{\mathrm{op},k+1,k}^{-1}\mathcal{T}_{\mathrm{op},k+1,k} - \frac{1}{2}\Psi_{22}\boldsymbol{\varpi}_{\mathrm{op},k+1}^\curlywedge\mathcal{J}_{\mathrm{op},k+1,k}^{-1}\mathcal{T}_{\mathrm{op},k+1,k} \\
\frac{\partial\boldsymbol{\varpi}_\tau}{\partial\boldsymbol{\eta}_k} &= \Lambda_{22} \\
\frac{\partial\boldsymbol{\varpi}_\tau}{\partial\boldsymbol{\eta}_{k+1}} &= \Psi_{22}\mathcal{J}_{\mathrm{op},k+1,k}^{-1}
\end{aligned}
$$

Note: the Jacobians for $\Big[\boldsymbol{\Lambda}_1(\tau)\hat{\boldsymbol{\gamma}}_k(t_k) + \boldsymbol{\Psi}_1(\tau)\hat{\boldsymbol{\gamma}}_k(t_{k+1})\Big]$ look the same, you just need to use the appropriate interpolation constants: $\boldsymbol{\Lambda}_1, \boldsymbol{\Psi}_1$.